201 Willowbrook Boulevard
P.O. Box 290
Wayne, NJ 07470
201 785-0700
212 926-2878
Fax 201-785-0023

Woodward-Clyde Consultants

14 November 1990
87X4660

REC'D
11-16-90
F.B

EPA Comments INCORPORATED IN 1-16-91 FINAL REVISION DOCUMENT

Mr Frank Battaglia
USEPA Region I
Waste Management Division
90 Canal Street
Boston, MA 02114

Dear Frank:

Please find enclosed the revised Data Validation Appendix IX checklists for your final review, plus the Data Summary Forms to be utilized during the Remedial Investigation data validation/data reduction process.

If you have any questions on the above, please do not hesitate to contact Diana Baldi at 919-632-6000 or myself at 201-785-0700, Extension 372.

Very truly yours,

John P. Lorenzo
Senior Staff Scientist/Project Chemist

JPL:ef
87X4660\001.ltr
cc: Diana Baldi (Ciba Geigy)
Joanna Hall (Alliance Corp)
Mark Houlday (WCC)

CIBA-GEIGY

INORGANIC REGION I WORKSHEETS

RE-EDITED FOR APPENDIX IX

CONSTITUENTS

Prepared by:

WOODWARD-CLYDE CONSULTANTS
201 WILLOWBROOK BOULEVARD
WAYNE, NEW JERSEY 07470

CIBA GEIGY CORPORATION
410 SWING ROAD
GREENSBORO, NORTH CAROLINA 27419

Radian Corporation
8501 MO-PAC Blvd.
Austin, Texas 78720

CIBA-GEIGY
INORGANIC REGION I WORKSHEET

Background: The term hazardous constituent used in the Solid Waste Disposal Act Section 3004(u) means constituents found in Appendix VIII of 40CFR part 261. EPA also defines hazardous constituents as those constituents identified in Appendix IX of 40CFR part 264. Appendix IX constituents generally constitutes a subset of Appendix VIII which are particularly suitable for ground water analyses.

In general, where very little is known of waste characteristics, and where there is a potential for a wide spectrum of wastes to have been released, only then is an owner/operator required to perform an extensive routine analysis for a broader spectrum of waste such as an Appendix IX analysis.

Radian Corporation of Austin, Texas, has been sub-contracted by WCC to analyze the 19 inorganic hazardous constituents in Appendix IX and will be utilizing the following SW-846 procedures listed in Table 1. As such, the enclosed Inorganic Region I Data Validation Worksheets have been modified accordingly for each fraction to conform to the QA/QC criteria of each SW-846 test methods in Table 1.

TABLE 1

SELECTED ANALYTICAL METHODS FOR INORGANIC APPENDIX IX ANALYSES

SW-846 Method	General Category/ Analyte	Technique	Number of Analytes Measured
6010	Metals	ICP	11
7041	Antimony	GFAA	1
7060	Arsenic	GFAA	1
7421	Lead	GFAA	1
7470	Mercury	CVAA	1
7740	Selenium	GFAA	1
7841	Thallium	GFAA	1
9012	Cyanide	Colorimetric	1
9030	Sulfide	Titrimetric	1
		TOTAL	19

ICP - Inductively Coupled Plasma Spectrometry (all other metals)
GFAA - Graphite Furnace Atomic Absorption Spectrometry (normally only arsenic, antimony, lead, selenium, and thallium)
CVAA - Cold Vapor Atomic Absorption Spectroscopy (mercury analyses only)

INORGANIC METALS

SUMMARY TABLES

APPENDIX III METALS

DATA SUMMARY FORM: I N O R G A N I C S

GROUND
WATER SAMPLES (TOTAL)
(µg/L) PPB
NON-FILTERED SAMPLES

Site Name: _____

Case #: _____ **Sampling Date(s):** _____

+Due to dilution, sample quantitation limit is affected. See dilution table for specifics.

	Sample No.											
	Dilution Factor											
	Location											
PQL	ANALYTE	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q
30	ANTIMONY											
2	*Arsenic											
10	Barium											
2	Beryllium											
5	*Cadmium											
10	*Chromium											
20	Cobalt											
20	Copper											
2	*Lead											
0.2	Mercury											
20	*Nickel											
2	Selenium											
10	Silver											
100	TIN											
2	Thallium											
20	Vanadium											
20	Zinc											

PQL = ~~Contract Required Detection~~ Limit
PRACTICAL QUANTITATION

*Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS

revised 10/90

Appendix IX METALS

DATA SUMMARY FORM: I N O R G A N I C S

Page ____ of ____

GROUND
WATER SAMPLES (DISSOLVED)
(µg/L) PPB FILTERED SAMPLES

Site Name: _____

Case #: _____ **Sampling Date(s):** _____

+Due to dilution, sample quantitation limit is affected. See dilution table for specifics.

	Sample No.											
	Dilution Factor											
	Location											
PQL	ANALYTE	Conc. Q	Conc. Q	Conc. Q	Conc. Q	Conc. Q	Conc. Q	Conc. Q	Conc. Q	Conc. Q	Conc. Q	Conc. Q
7	ANTIMONY											
1	*Arsenic											
10	Barium											
2	Beryllium											
5	*Cadmium											
10	*Chromium											
20	Cobalt											
20	Copper											
3	*Lead											
0.2	Mercury											
20	*Nickel											
5	Selenium											
10	Silver											
100	TIN											
5	Thallium											
20	Vanadium											
20	Zinc											

PQL = ~~Contract Required Detection~~ Limit
PRACTICAL QUANTITATION

*Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS

revised 10/90

APPENDIX IX METALS

DATA SUMMARY FORM: I N O R G A N I C S

Page ___ of ___

ite Name: _____

ase #: _____ Sampling Date(s): _____

SOIL SAMPLES
(ug/kg) PPM

+Due to dilution, sample quantitation limit is affected.
See dilution table for specifics.

	Sample No.										
	Dilution Factor										
	Location										
PQL	ANALYTE	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q
3	ANTIMONY										
0.2	*Arsenic										
1.0	Barium										
0.2	Beryllium										
0.5	*Cadmium										
1.0	*Chromium										
2	Cobalt										
2	Copper										
0.2	*Lead										
0.2	Mercury										
2	*Nickel										
0.2	Selenium										
1.0	Silver										
10	TIN										
0.2	Thallium										
2	Vanadium										
2	Zinc										

PQL = ~~Contract Required Detection~~ Limit
PRACTICAL QUANTITATION

*Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS

revised 10/90

REGION I

Site Name _____
Reference Number _____

REGION I REVIEW OF INORGANIC SW-846 (3RD EDITION)

The hardcopied (laboratory name) _____ data package received at Region I has been reviewed and the quality assurance and performance data summarized. The data review included:

Matrix:
SDG. No.:
No. of Samples:
Sample Identifiers:
Trip Blank No.:
Equipment Blank No.:
Field Dup Nos.:

Sampling Date(s):
Shipping Date(s):
Date Rec'd by Lab:

SW-846 (3rd Edition) requires that specific analytical work be done. The general criteria used to determine the performance were based on an examination of:

-Data Completeness
-Holding Times
-Calibrations
-Blanks
-ICP Interference Check Results
-Matrix Spike Recoveries
-Laboratory Duplicates
-Field Duplicates
-Lab Control Sample Results
-Furnace AA Results
-ICP Serial Dilution Results
-Detection Limit Results
-Sample Quantitation

Overall Comments:

Definitions and Qualifiers:

A - Acceptable data.
J - Approximate data due to quality control criteria.
R - Reject data due to quality control criteria
U - Analyte not detected

Reviewer: Date:

REGION I
Data Review Worksheets

I. DATA COMPLETENESS

MISSING INFORMATION	DATE LAB CONTACTED	DATE REC'D

II. HOLDING TIMES Complete table for all samples and circle the analysis date for samples not within criteria.

SAMPLE ID	DATE SAMPLED	HG DATE ANALYSIS	CYANIDE DATE ANALYSIS	OTHERS DATE ANALYSIS	pH	ACTION

METALS - 180 DAYS FROM SAMPLE COLLECTION
MERCURY - 28 DAYS FROM SAMPLE COLLECTION
CYANIDE - 14 DAYS FROM SAMPLE COLLECTION

ACTION:

1. If holding times are exceeded all positive results are estimated (J) and non-detects are estimated (UJ).

2. If holding times are grossly exceeded, the reviewer may determine that non-detects are unusable (R).

REGION I
Data Review Worksheets

III A. INSTRUMENT CALIBRATION (Section 1)

1. Recovery Criteria

List the analytes which did not meet the percent recovery (%R) criteria for Initial or Continuing Calibration.

DATE	ICV/CCV#	ANALYTE	%R	ACTION	SAMPLES AFFECTED

ACTIONS:

If any analyte does not meet the %R criteria follow the actions stated below:

For Positive Results:

	Accept	Estimate (J)	Reject (R)
Metals	90-110%R	75-89%R, 111-125%R	<75%R, >125%R
Mercury	80-120%R	65-79%R, 121-135%R	<65%R, >135%R
Cyanide	85-115%R	70-84%R, 116-130%R	<70%R, >130%R

For Non-detected Results:

	Accept	Estimate (UJ)	Reject (R)
Metals	90-125%R	75-89%R	<75%R, >125%R
Mercury	80-135%R	65-79%R	<65%R, >135%R
Cyanide	85-130%R	70-84%R	<70%R, >130%R

III B. INSTRUMENT CALIBRATION (Section 2)

2. Analytical Sequence

A. Did the laboratory use the proper number of standards for calibration as described in the SW-846 (3rd Edition) manual. There is no difference on the proper number of standards between the CLP-SOW and SW-846. Yes or No

B. Were calibrations performed at the beginning of each day (or every 8 hours): whichever is more frequent. Yes or No

C. Were midpoint calibration standards analyzed at the beginning of sample analysis and at a minimum frequency of ten percent? Yes or No

D. Were the correlation coefficients for the calibration curves for AA, Hg, and CN $\leq$ 0.995? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below and list the samples affected.

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet must be used for soil and water blanks.

MATRIX: _____

1. Laboratory Blanks

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS

3. Frequency Requirements

A. Was a preparation blank carried through the entire analytical process for each matrix type or group of 20 samples, whichever is more frequent? Yes or No

B. Was a reagent blank with a minimum of three standards run daily? Yes or No

C. If 20 or more samples were run, was a reagent blank analyzed along with a mid-range standard at a frequency of every 10 samples? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

IV B. BLANK ANALYSIS RESULTS (Section 4)

4. Blank Actions

The Action Levels for any analyte is equal to five times the highest concentration of that element's contamination in any blank. The action level for samples which have been concentrated or diluted should be multiplied by the concentration/dilution factor. No positive sample result should be reported unless the concentration of the analyte in the sample exceeds the Action Level (AL). Specific actions are as follows:

1. When the concentration is greater than the IDL, but less than the Action Level, report the sample concentration detected with a U.

2. When the sample concentration is greater than the Action Level, report the sample concentration unqualified.

MATRIX: _____ MATRIX: _____

ELEMENT	MAX. CONC./ UNITS	AL/ UNITS	ELEMENT	MAX. CONC./ UNITS	AL/ UNITS

NOTE: Blanks analyzed during a soil case must be converted to mg/kg in order to compare them with the sample results.

$$\text{conc. in ug/l} \times \frac{\text{volume diluted to (100 ml)}}{\text{weight digested (1 gram)}} \times \frac{1 \text{ liter}}{1000 \text{ ml}} \times \frac{1000 \text{ gms.}}{1 \text{ kg}} \times \frac{1 \text{ mg}}{1000 \text{ ug}} = \frac{\text{mg}}{\text{kg}}$$

Multiplying this result by 5 to arrive at the action level gives a final result in mg/kg which can then be compared to sample results.

The SW-846 (3rd Edition) requirement is that the calibration blank be within a three (3) standard deviation window of the mean blank value. As such, gross blank contamination warrants the data validator to contact the laboratory to verify this was performed. List all anomalies in the Inorganic Regional Data Assessment.

V A. ICP INTERFERENCE CHECK SAMPLE (Sections 1 & 2)

1. Recovery Criteria

List any elements in the ICS AB solution which did not meet the criteria for %R. SW-846 (3rd Edition) does warrant a ±20% window of the true value. The laboratory in accordance with SW-846 Method 6010 must follow an established control limit of 1.5 times the standard deviation of the mean value. If reoccurring problems arise, contact the lab and determine if any deviation from this procedure has occurred.

DATE	ELEMENT	%R	ACTION	SAMPLES AFFECTED

ACTIONS:

If an element does not meet the %R criteria, follow the actions stated below:

	PERCENT RECOVERY		
	<50%	50-79%	>120%
Positive Sample Results	R	J	J
Non-detected Sample Results	R	UJ	A

2. Frequency Requirements

Were Interference QC samples run at the beginning and end of each batch analysis run or a minimum of twice per 8 hour working shift, whichever is more frequent? Yes or No

If no,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below and list the samples affected.

V B. ICP INTERFERENCE CHECK SAMPLE (Section 3)

3. Report the concentration of any elements detected in the ICS A solution > 2xIDL that should not be present.

ELEMENT	CONC. DETECTED IN THE ICS	CONC. OF INTERFERENTS IN THE ICS			
		AL	CA	FE	MG

Estimate the concentration produced by the interfering element in all affected samples. See guidelines for examples. List the samples affected by interferences below:

SAMPLE AFFECTED	ELEMENT AFFECTED	SAMPLE CONC. (ug/L)	SAMPLE INTERFERENT CONC.				ESTIMATED INTERF. (ug/L)
			AL	CA	FE	MG	

ACTIONS:

1. In general, the sample data can be accepted without qualification if the sample concentrations of Al, Ca, Fe, and Mg are less than 50% of their respective levels in the ICS solution.

2. Estimate (J) positive results for affected elements for samples with levels of interferents 50% or more of that in the ICS solution.

3. Reject (R) positive results if the reported concentration is due entirely to the interfering element.

4. Estimate (UJ) non-detected results for which false negatives are suspect.

Give explanations for any actions taken below:

REGION I
Data Review Worksheets

VI. MATRIX SPIKE

TR # _____ MATRIX: _____

1. Recovery Criteria

List the percent recoveries for analytes which did not meet the required criteria.

S - amount of spike added
SSR - spikes sample request
SR - sample result

Analyte	SSR	SR	S	%R	Action

Matrix Spike Actions apply to all samples of the same matrix.

ACTIONS:

1. If the sample concentration exceeds the spike concentration by a factor of 4 or more, no action is taken.

2. If any analyte does not meet the %R criteria follow the actions stated below:

	PERCENT RECOVERY		
	<30%	30%-74%	>125%
Positive Sample Results	J	J	J
Non-detected Results	R	UJ	No Action

2. Frequency Criteria

A. Was a matrix spike prepared at the required frequency? Yes or No

A separate worksheet should be used for each matrix spike pair.

VII. LABORATORY DUPLICATES

List the concentrationsof any analyte not meeting the criteria for duplicate precision. For soil duplicates, calculate the PQL in mg/kg using the sample weight, volume and percent solids data for the sample. Indicate what criteria was used to evaluate precision by circling either the RPD or PQL for each element.

MATRIX: _____

Element	PQL* water ug/L	PQL* soil mg/kg	Sample #	Duplicate #	RPD**	Action
			_____	_____		
Antimony	30					
Arsenic	2					
Barium	10					
Beryllium	2					
Cadmium	5					
Chromium	10					
Cobalt	20					
Copper	20					
Lead	2					
Mercury	0.2					
Nickel	20					
Selenium	2					
Silver	10					
Thallium	2					
Tin	100					
Vanadium	20					
Zinc	20					
Cyanide	10					

Laboratory Duplicate Actions should be applied to all other samples of the same matrix type.

ACTIONS:

1. Estimate (J) positive results for elements which have an RPD >20% for waters and >35% for soils.

2. If sample results are less than 5x the PQL, estimate (J) positive results for elements whose absolute difference is >PQL, (2xPQL for soils). If both samples are non-detected, the RPD is not calculated (NC).

* No specific detection limits are required in SW-846. All PQLs are of a recommended laboratory calculated nature. As such, all CLP-CRDLS will be substituted with the Radian calculated PQLs for reporting purposes.

** Mean RPD of ±20% or ±2 standard deviations of the last 25 runs (whichever is tighter) for all analytes as warranted by SW-846 (3rd Edition) protocols will be utilized.

VIII. FIELD DUPLICATES

List the concentrations of all analytes in the field duplicate pair. For soil duplicates, calculate the PQL in mg/kg using the sample weight, volume and percent solids data for the sample. Indicate what criteria was used to evaluate the precision by circling either the RPD or PQL for each element.

MATRIX: _____

Element	PQL water ug/L	PQL soil mg/kg	Sample #	Duplicate #	RPD**	Action
			_____	_____		
Antimony	30					
Arsenic	2					
Barium	10					
Beryllium	2					
Cadmium	5					
Chromium	10					
Cobalt	20					
Copper	20					
Lead	2					
Mercury	0.2					
Nickel	20					
Selenium	2					
Silver	10					
Sodium	5000					
Thallium	2					
Tin	100					
Vanadium	20					
Zinc	20					
Cyanide	10					

Field Duplicate actions should be aplied to all other samples of the same matrix type.

ACTIONS:

1. Estimate (J) positive results for elementes which have an RPD >30% for waters and >50% for soils.

2. If sample results are less than 5x the PQL, estimate (J) positive results and (UJ) nondetected results for elements whose absolute difference is >2xPQL, (4xPQL for soils). If both samples are non-detected, the RPD is not calculated (NC).

* No specific detection limits are required in SW-846. All PQLs are of a recommended laboratory calculated nature. As such, all CLP-CRDLs will be substituted with the Radian calculated PQLs for reporting purposes.

** Mean RPD of ±20% or ±2 standard deviations of the last 25 runs (whichever is tighter) for all analytes as warranted based on SW-846 (3rd Edition) protocols will be utilized.

IX. LABORATORY CONTROL SAMPLE

1. Aqueous LCS

List any LCS recoveries not within the 80-120% criteria and the samples affected.

DATE	ELEMENT	%R	ACTION	SAMPLES AFFECTED

Note: The SW-846 (3rd Edition) LCS recovery window is ±20%. The current 80 - 100% window is acceptable.

2. Solid LCS

List any analytes that were not within the control windows set by the EPA manufacturers for the solid LCS sample. Lot specifications are available on request from Radian.

ELEMENT	LCS CONC.	CONTROL WINDOWS	ACTION	SAMPLES AFFECTED

ACTIONS:

AQUEOUS LCS	<50%	51-79%	>120%
Positive Results	R	J	J
Non-detected Results	R	UJ	A

SOLID LCS	<EPA Control Windows	>EPA Control Windows
Positive Results	J	J
Non-detected Results	UJ	A

3. Frequency Criteria

A. Was an LCS analyzed for every matrix, every digestion batch, and every 20 samples? Yes or No

X A. FURNACE ATOMIC ABSORPTION ANALYSIS

1. Duplicate Precision

Duplicate injections must agree within ± 20%.

If duplicate injections do not agree within ± 20% for samples/elements the laboratory must rerun and report the lowest coefficient of variation as per SW-846 (3rd Edition) protocols.

2. Post Digestion Spike Recoveries

Spike recoveries met the 75-125% recovery criteria for all samples.

Method of Standard Addition (MSA) is not being performed during round I of sampling. (Refer to Action #3 below).

Note CLP requirements and not SW-846 will be used as guidance when applying the qualification actions below.

ACTIONS:

1. Estimate (J) positive results if duplicate injections are outside ± 20 % RSD or CV.

2. If the sample absorbance is <50% of post digestion spike absorbance the following actions should be applied:

	PERCENT RECOVERY		
	<10%	11%-84%	>115%
Positive Sample Results	R	J	J
Non-detected Results	R	UJ	No Action

3. Estimate (J) sample results if MSA was required.

XI. INDUCTIVELY COUPLED PLASMA (ICP) SERIAL DILUTION ANALYSIS

Serial Dilutions were performed for each matrix and results of the diluted sample analysis agreed within ten percent of the original undiluted analysis as per CLP guidance and not SW-846 (3rd Edition) protocols.

Serial Dilutions were not performed for the following:

_____

Serial Dilutions were performed, but analytical results did not agree within 10% for analyte concentrations greater than 50x the IDL before dilution.

Report all results below that do not meet the required laboratory criteria for ICP serial dilution analysis.

MATRIX: _____

ELEMENT	IDL	50xIDL	SAMPLE RESULT	SERIAL DILUTION	%D	ACTION
Barium						
Beryllium						
Cadmium						
Chromium						
Cobalt						
Copper						
Nickel						
Silver						
Sodium						
Tin						
Vanadium						
Zinc						

Actions apply to all samples of the same matrix.

ACTIONS:

1. Estimate (J) positive results if %D >15.

Note: Sample result must be $\geq$50x PQL for calculation by serial dilution; then use $\pm$10% original undiluted value as criteria.

XII. DETECTION LIMIT RESULTS

1. Instrument Detection Limits

Instrument Detection Limit results were present and found to be less than the Contract Required Detection Limits.

IDLs were not included in the data package on Form XI.

IDLs were present, but the criteria was not met for the following elements: _____

2. Reporting Requirements

Were sample results on Form I reported down to the IDL not the CRDL for all analytes?	Yes or No
Were sample results that were analyzed by ICP for Se, Tl, As, or Pb at least 5X IDL.	Yes or No
Were sample weights, volumes, and dilutions taken into account when reporting detection limits on Form I.	Yes or No

If No,

The reported results may be inaccurate. Make the necessary changes on the data summary tables and request that the laboratory resubmit the corrected data.

XIII. SAMPLE QUANTITATION

Sample results fall within the linear range for ICP and within the calibrated range for all other parameters.

Sample results were beyond the linear range/calibration range of the instrument for the following samples/elements:

In the space below, please show a minimum of one sample calculation per method:

Lab formula: $\frac{ug}{ul} \times \frac{100\ ml}{g} = ug/g\ (mg/kg)$

Water $\frac{ug}{l} \times \frac{100\ ml}{100\ ml} = ug/l$

ICP

FURNACE

MERCURY

CYANIDE

For soil samples, the following equation maya be necessary to convert raw data values (usually reported in ug/L) to actual sample concentrations (mg/kg):

The lab is required to use 1 gram sample (wet weight) to 100 ml.

Wet weight concentration =

Solid digest conc. in $\frac{ug}{L} \times \frac{200ml}{1\ gm} \times \frac{IL}{1000\ ml} \times \frac{1000gm}{1kg} \times \frac{1mg}{1000ug} = \frac{mg}{kg}$

In addition the sample results are converted to dry weight using the percent solids calculations:

$\frac{\text{Wet weight conc.}}{\%solids} \times 100 =$ final concentration, dry weight (mg/kg)

INORGANIC REGIONAL DATA ASSESSMENT Region ____

REFERENCE NO. _____ SITE _____
LABORATORY _____ NO. OF SAMPLES/
MATRIX _____
SDG # _____
REVIEWER (IF NOT ESD) _____
SW-846 _____
REVIEWER'S NAME _____
COMPLETION DATE _____

DATA ASSESSMENT SUMMARY

		ICP	AA	Hg	CYANIDE
1.	HOLDING TIMES	____	____	____	____
2.	CALIBRATIONS	____	____	____	____
3.	BLANKS	____	____	____	____
4.	ICS	____	____	____	____
5.	LCS	____	____	____	____
6.	DUPLICATE ANALYSIS	____	____	____	____
7.	MATRIX SPIKE	____	____	____	____
8.	MSA (not performed)	--	--	--	--
9.	SERIAL DILUTION	____	____	____	____
10.	SAMPLE VERIFICATION	____	____	____	____
11.	OTHER QC	____	____	____	____
12.	OVERALL ASSESSMENT	____	____	____	____

O = Data had no problems/or qualified due to minor problems.
M = Data qualified due to major problems.
Z = Data unacceptable.
X = Problems, but do not affect data.

ACTION ITEMS: _____

AREAS OF CONCERN: _____

CIBA-GEIGY

INORGANIC REGION I WORKSHEETS

RE-EDITED FOR APPENDIX IX

CONSTITUENTS

Prepared by:

WOODWARD-CLYDE CONSULTANTS
201 WILLOWBROOK BOULEVARD
WAYNE, NEW JERSEY 07470

CIBA GEIGY CORPORATION
410 SWING ROAD
GREENSBORO, NORTH CAROLINA 27419

Radian Corporation
8501 MO-PAC Blvd.
Austin, Texas 78720

CIBA-GEIGY
INORGANIC REGION I WORKSHEET

Background: The term hazardous constituent used in the Solid Waste Disposal Act Section 3004(u) means constituents found in Appendix VIII of 40CFR part 261. EPA also defines hazardous constituents as those constituents identified in Appendix IX of 40CFR part 264. Appendix IX constituents generally constitutes a subset of Appendix VIII which are particularly suitable for ground water analyses.

In general, where very little is known of waste characteristics, and where there is a potential for a wide spectrum of wastes to have been released, only then is an owner/operator required to perform an extensive routine analysis for a broader spectrum of waste such as an Appendix IX analysis.

Radian Corporation of Austin, Texas, has been sub-contracted by WCC to analyze the 19 inorganic hazardous constituents in Appendix IX and will be utilizing the following SW-846 procedures listed in Table 1. As such, the enclosed Inorganic Region I Data Validation Worksheets have been modified accordingly for each fraction to conform to the QA/QC criteria of each SW-846 test methods in Table 1.

TABLE 1

SELECTED ANALYTICAL METHODS FOR INORGANIC APPENDIX IX ANALYSES

SW-846 Method	General Category/ Analyte	Technique	Number of Analytes Measured
6010	Metals	ICP	11
7041	Antimony	GFAA	1
7060	Arsenic	GFAA	1
7421	Lead	GFAA	1
7470	Mercury	CVAA	1
7740	Selenium	GFAA	1
7841	Thallium	GFAA	1
9012	Cyanide	Colorimetric	1
9030	Sulfide	Titrimetric	1
		TOTAL	19

ICP - Inductively Coupled Plasma Spectrometry (all other metals)
GFAA - Graphite Furnace Atomic Absorption Spectrometry (normally only arsenic, antimony, lead, selenium, and thallium)
CVAA - Cold Vapor Atomic Absorption Spectroscopy (mercury analyses only)

INORGANIC METALS

SUMMARY TABLES

APPENDIX IX METALS

DATA SUMMARY FORM: I N O R G A N I C S

GROUND
WATER SAMPLES (TOTAL)
(µg/L) PPB
NON-FILTERED SAMPLES

Site Name: _____

Case #: _____ **Sampling Date(s):** _____

+Due to dilution, sample quantitation limit is affected. See dilution table for specifics.

PQL	ANALYTE	Sample No. / Dilution Factor / Location	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
30	ANTIMONY																					
2	*Arsenic																					
10	Barium																					
2	Beryllium																					
5	*Cadmium																					
10	*Chromium																					
20	Cobalt																					
20	Copper																					
2	*Lead																					
0.2	Mercury																					
20	*Nickel																					
2	Selenium																					
10	Silver																					
100	TIN																					
2	Thallium																					
20	Vanadium																					
20	Zinc																					

PQL = ~~Contract Required Detection~~ Limit
PRACTICAL QUANTITATION

*Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS

revised 10/90

Appendix IX METALS

DATA SUMMARY FORM: INORGANICS

Page ____ of ____

GROUND
WATER SAMPLES (DISSOLVED)
(µg/L) PPB FILTERED SAMPLES

Site Name: _____

Case #: _____ Sampling Date(s): _____

+Due to dilution, sample quantitation limit is affected. See dilution table for specifics.

	Sample No.										
	Dilution Factor										
	Location										
PQL	ANALYTE	Conc. Q	Conc. Q	Conc. Q	Conc. Q	Conc. Q	Conc. Q	Conc. Q	Conc. Q	Conc. Q	Conc. Q
7	ANTIMONY										
1	*Arsenic										
10	Barium										
02	Beryllium										
5	*Cadmium										
10	*Chromium										
20	Cobalt										
20	Copper										
3	*Lead										
02	Mercury										
20	*Nickel										
5	Selenium										
10	Silver										
100	TIN										
5	Thallium										
20	Vanadium										
20	Zinc										

PQL = ~~Contract Required Detection~~ Limit
PRACTICAL QUANTITATION

*Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS

revised 10/90

APPENDIX IX METALS

DATA SUMMARY FORM: INORGANICS

Page ___ of ___

ite Name: _____

ase #: _____ Sampling Date(s): _____

SOIL SAMPLES
(ug/kg) PPM

+Due to dilution, sample quantitation limit is affected.
See dilution table for specifics.

	Sample No.											
	Dilution Factor											
	Location											
PQL	ANALYTE	Conc. Q	Conc. Q	Conc. Q	Conc. Q	Conc. Q	Conc. Q	Conc. Q	Conc. Q	Conc. Q	Conc. Q	Conc. Q
3	ANTIMONY											
0.2	*Arsenic											
1.0	Barium											
0.2	Beryllium											
0.5	*Cadmium											
1.0	*Chromium											
2	Cobalt											
2	Copper											
0.2	*Lead											
0.2	Mercury											
2	*Nickel											
0.2	Selenium											
1.0	Silver											
10.	TIN											
0.2	Thallium											
2	Vanadium											
2	Zinc											

PQL = ~~Contract Required Detection~~ Limit
PRACTICAL QUANTITATION

*Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS

revised 10/90

REGION I

Site Name _____
Reference Number _____

REGION I REVIEW OF INORGANIC SW-846 (3RD EDITION)

The hardcopied (laboratory name) _____ data package received at Region I has been reviewed and the quality assurance and performance data summarized. The data review included:

Matrix:
SDG. No.:
No. of Samples:
Sample Identifiers:
Trip Blank No.:
Equipment Blank No.:
Field Dup Nos.:

Sampling Date(s):
Shipping Date(s):
Date Rec'd by Lab:

SW-846 (3rd Edition) requires that specific analytical work be done. The general criteria used to determine the performance were based on an examination of:

-Data Completeness
-Holding Times
-Calibrations
-Blanks
-ICP Interference Check Results
-Matrix Spike Recoveries
-Laboratory Duplicates
-Field Duplicates
-Lab Control Sample Results
-Furnace AA Results
-ICP Serial Dilution Results
-Detection Limit Results
-Sample Quantitation

Overall Comments:

Definitions and Qualifiers:

A - Acceptable data.
J - Approximate data due to quality control criteria.
R - Reject data due to quality control criteria
U - Analyte not detected

Reviewer: Date:

REGION I
Data Review Worksheets

I. DATA COMPLETENESS

MISSING INFORMATION	DATE LAB CONTACTED	DATE REC'D

II. HOLDING TIMES Complete table for all samples and circle the analysis date for samples not within criteria.

SAMPLE ID	DATE SAMPLED	HG DATE ANALYSIS	CYANIDE DATE ANALYSIS	OTHERS DATE ANALYSIS	pH	ACTION

METALS - 180 DAYS FROM SAMPLE COLLECTION
MERCURY - 28 DAYS FROM SAMPLE COLLECTION
CYANIDE - 14 DAYS FROM SAMPLE COLLECTION

ACTION:

1. If holding times are exceeded all positive results are estimated (J) and non-detects are estimated (UJ).

2. If holding times are grossly exceeded, the reviewer may determine that non-detects are unusable (R).

III A. INSTRUMENT CALIBRATION (Section 1)

1. Recovery Criteria

List the analytes which did not meet the percent recovery (%R) criteria for Initial or Continuing Calibration.

DATE	ICV/CCV#	ANALYTE	%R	ACTION	SAMPLES AFFECTED

ACTIONS:

If any analyte does not meet the %R criteria follow the actions stated below:

For Positive Results:

	Accept	Estimate (J)	Reject (R)
Metals	90-110%R	75-89%R, 111-125%R	<75%R, >125%R
Mercury	80-120%R	65-79%R, 121-135%R	<65%R, >135%R
Cyanide	85-115%R	70-84%R, 116-130%R	<70%R, >130%R

For Non-detected Results:

	Accept	Estimate (UJ)	Reject (R)
Metals	90-125%R	75-89%R	<75%R, >125%R
Mercury	80-135%R	65-79%R	<65%R, >135%R
Cyanide	85-130%R	70-84%R	<70%R, >130%R

III B. INSTRUMENT CALIBRATION (Section 2)

2. Analytical Sequence

A. Did the laboratory use the proper number of standards for calibration as described in the SW-846 (3rd Edition) manual. There is no difference on the proper number of standards between the CLP-SOW and SW-846. Yes or No

B. Were calibrations performed at the beginning of each day (or every 8 hours): whichever is more frequent. Yes or No

C. Were midpoint calibration standards analyzed at the beginning of sample analysis and at a minimum frequency of ten percent? Yes or No

D. Were the correlation coefficients for the calibration curves for AA, Hg, and CN $\leq$ 0.995? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below and list the samples affected.

REGION I
Data Review Worksheet

IV A. BLANK ANALYSIS RESULTS (Sections 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet must be used for soil and water blanks.

MATRIX: _____

1. Laboratory Blanks

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS

3. Frequency Requirements

A. Was a preparation blank carried through the entire analytical process for each matrix type or group of 20 samples, whichever is more frequent? Yes or No

B. Was a reagent blank with a minimum of three standards run daily? Yes or No

C. If 20 or more samples were run, was a reagent blank analyzed along with a mid-range standard at a frequency of every 10 samples? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

IV B. BLANK ANALYSIS RESULTS (Section 4)

4. Blank Actions

The Action Levels for any analyte is equal to five times the highest concentration of that element's contamination in any blank. The action level for samples which have been concentrated or diluted should be multiplied by the concentration/dilution factor. No positive sample result should be reported unless the concentration of the analyte in the sample exceeds the Action Level (AL). Specific actions are as follows:

1. When the concentration is greater than the IDL, but less than the Action Level, report the sample concentration detected with a U.

2. When the sample concentration is greater than the Action Level, report the sample concentration unqualified.

MATRIX: _____ MATRIX: ____

ELEMENT	MAX. CONC./ UNITS	AL/ UNITS	ELEMENT	MAX. CONC./ UNITS	AL/ UNITS

NOTE: Blanks analyzed during a soil case must be converted to mg/kg in order to compare them with the sample results.

$$\text{conc. in ug/l} \times \frac{\text{volume diluted to (100 ml)}}{\text{weight digested (1 gram)}} \times \frac{1 \text{ liter}}{1000 \text{ ml}} \times \frac{1000 \text{ gms.}}{1 \text{ kg}} \times \frac{1 \text{ mg}}{1000 \text{ ug}} = \frac{\text{mg}}{\text{kg}}$$

Multiplying this result by 5 to arrive at the action level gives a final result in mg/kg which can then be compared to sample results.

The SW-846 (3rd Edition) requirement is that the calibration blank be within a three (3) standard deviation window of the mean blank value. As such, gross blank contamination warrants the data validator to contact the laboratory to verify this was performed. List all anomalies in the Inorganic Regional Data Assessment.

V A. ICP INTERFERENCE CHECK SAMPLE (Sections 1 & 2)

1. Recovery Criteria

List any elements in the ICS AB solution which did not meet the criteria for %R. SW-846 (3rd Edition) does warrant a ±20% window of the true value. The laboratory in accordance with SW-846 Method 6010 must follow an established control limit of 1.5 times the standard deviation of the mean value. If reoccurring problems arise, contact the lab and determine if any deviation from this procedure has occurred.

DATE	ELEMENT	%R	ACTION	SAMPLES AFFECTED

ACTIONS:

If an element does not meet the %R criteria, follow the actions stated below:

	PERCENT RECOVERY		
	<50%	50-79%	>120%
Positive Sample Results	R	J	J
Non-detected Sample Results	R	UJ	A

2. Frequency Requirements

Were Interference QC samples run at the beginning and end of each batch analysis run or a minimum of twice per 8 hour working shift, whichever is more frequent? Yes or No

If no,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below and list the samples affected.

REGION I
Data Review Worksheets

V B. ICP INTERFERENCE CHECK SAMPLE (Section 3)

3. Report the concentration of any elements detected in the ICS A solution > 2xIDL that should not be present.

ELEMENT	CONC. DETECTED IN THE ICS	CONC. OF INTERFERENTS IN THE ICS			
		AL	CA	FE	MG

Estimate the concentration produced by the interfering element in all affected samples. See guidelines for examples. List the samples affected by interferences below:

SAMPLE AFFECTED	ELEMENT AFFECTED	SAMPLE CONC. (ug/L)	SAMPLE INTERFERENT CONC.				ESTIMATED INTERF. (ug/L)
			AL	CA	FE	MG	

ACTIONS:

1. In general, the sample data can be accepted without qualification if the sample concentrations of Al, Ca, Fe, and Mg are less than 50% of their respective levels in the ICS solution.
2. Estimate (J) positive results for affected elements for samples with levels of interferents 50% or more of that in the ICS solution.
3. Reject (R) positive results if the reported concentration is due entirely to the interfering element.
4. Estimate (UJ) non-detected results for which false negatives are suspect.

Give explanations for any actions taken below:

REGION I
Data Review Worksheets

VI. MATRIX SPIKE

TR # _____ MATRIX: _____

1. Recovery Criteria

List the percent recoveries for analytes which did not meet the required criteria.

S - amount of spike added
SSR - spikes sample request
SR - sample result

Analyte	SSR	SR	S	%R	Action

Matrix Spike Actions apply to all samples of the same matrix.

ACTIONS:

1. If the sample concentration exceeds the spike concentration by a factor of 4 or more, no action is taken.

2. If any analyte does not meet the %R criteria follow the actions stated below:

	PERCENT RECOVERY		
	<30%	30%-74%	>125%
Positive Sample Results	J	J	J
Non-detected Results	R	UJ	No Action

2. Frequency Criteria

A. Was a matrix spike prepared at the required frequency? Yes or No

A separate worksheet should be used for each matrix spike pair.

VII. LABORATORY DUPLICATES

List the concentrations of any analyte not meeting the criteria for duplicate precision. For soil duplicates, calculate the PQL in mg/kg using the sample weight, volume and percent solids data for the sample. Indicate what criteria was used to evaluate precision by circling either the RPD or PQL for each element.

MATRIX: _____

Element	PQL* water ug/L	PQL* soil mg/kg	Sample # _____	Duplicate # _____	RPD**	Action
Antimony	30					
Arsenic	2					
Barium	10					
Beryllium	2					
Cadmium	5					
Chromium	10					
Cobalt	20					
Copper	20					
Lead	2					
Mercury	0.2					
Nickel	20					
Selenium	2					
Silver	10					
Thallium	2					
Tin	100					
Vanadium	20					
Zinc	20					
Cyanide	10					

Laboratory Duplicate Actions should be applied to all other samples of the same matrix type.

ACTIONS:

1. Estimate (J) positive results for elements which have an RPD >20% for waters and >35% for soils.

2. If sample results are less than 5x the PQL, estimate (J) positive results for elements whose absolute difference is >PQL, (2xPQL for soils). If both samples are non-detected, the RPD is not calculated (NC).

* No specific detection limits are required in SW-846. All PQLs are of a recommended laboratory calculated nature. As such, all CLP-CRDLS will be substituted with the Radian calculated PQLs for reporting purposes.

** Mean RPD of ±20% or ±2 standard deviations of the last 25 runs (whichever is tighter) for all analytes as warranted by SW-846 (3rd Edition) protocols will be utilized.

VIII. FIELD DUPLICATES

List the concentrations of all analytes in the field duplicate pair. For soil duplicates, calculate the PQL in mg/kg using the sample weight, volume and percent solids data for the sample. Indicate what criteria was used to evaluate the precision by circling either the RPD or PQL for each element.

MATRIX: _____

Element	PQL water ug/L	PQL soil mg/kg	Sample #	Duplicate #	RPD**	Action
			_____	_____		
Antimony	30					
Arsenic	2					
Barium	10					
Beryllium	2					
Cadmium	5					
Chromium	10					
Cobalt	20					
Copper	20					
Lead	2					
Mercury	0.2					
Nickel	20					
Selenium	2					
Silver	10					
Sodium	5000					
Thallium	2					
Tin	100					
Vanadium	20					
Zinc	20					
Cyanide	10					

Field Duplicate actions should be aplied to all other samples of the same matrix type.

ACTIONS:

1. Estimate (J) positive results for elementes which have an RPD >30% for waters and >50% for soils.

2. If sample results are less than 5x the PQL, estimate (J) positive results and (UJ) nondetected results for elements whose absolute difference is >2xPQL, (4xPQL for soils). If both samples are non-detected, the RPD is not calculated (NC).

* No specific detection limits are required in SW-846. All PQLs are of a recommended laboratory calculated nature. As such, all CLP-CRDLs will be substituted with the Radian calculated PQLs for reporting purposes.

** Mean RPD of ±20% or ±2 standard deviations of the last 25 runs (whichever is tighter) for all analytes as warranted based on SW-846 (3rd Edition) protocols will be utilized.

IX. LABORATORY CONTROL SAMPLE

1. Aqueous LCS

List any LCS recoveries not within the 80-120% criteria and the samples affected.

DATE	ELEMENT	%R	ACTION	SAMPLES AFFECTED

Note: The SW-846 (3rd Edition) LCS recovery window is ±20%. The current 80 - 100% window is acceptable.

2. Solid LCS

List any analytes that were not within the control windows set by the EPA manufacturers for the solid LCS sample. Lot specifications are available on request from Radian.

ELEMENT	LCS CONC.	CONTROL WINDOWS	ACTION	SAMPLES AFFECTED

ACTIONS:

AQUEOUS LCS	<50%	51-79%	>120%
Positive Results	R	J J	
Non-detected Results	R	UJ A	

SOLID LCS	<EPA Control Windows	>EPA Control Windows
Positive Results	J J	
Non-detected Results	UJ A	

3. Frequency Criteria

A. Was an LCS analyzed for every matrix, every digestion batch, and every 20 samples? Yes or No

CIBA-GEIGY

ORGANIC REGION I WORKSHEETS

RE-EDITED FOR APPENDIX IX

CONSTITUENTS

Prepared by:

WOODWARD-CLYDE CONSULTANTS
201 WILLOWBROOK BOULEVARD
WAYNE, NEW JERSEY 07470

CIBA GEIGY CORPORATION
410 SWING ROAD
GREENSBORO, NORTH CAROLINA 27419

Radian Corporation
8501 MO-PAC Blvd.
Austin, Texas 78720

CIBA-GEIGY

ORGANIC REGION I WORKSHEET

Background: The term hazardous constituent used in the Solid Waste Disposal Act Section 3004(u) means constituents found in Appendix VIII to 40CFR part 261. EPA also defines those constituents identified in Appendix IX to 40CFR part 264. Appendix IX constituents generally constitutes a subset of Appendix VIII particularly suitable for ground water analyses.

In general, where very little is known of waste characteristics, and where there is a potential for a wide spectrum of wastes to have been released, only then is the owner/operator required to perform an extensive routine analysis for a broader spectrum of waste such as an Appendix IX analysis.

Radian Corporation of Austin, Texas, has been sub-contracted by WCC to analyze the 218 organic hazardous constituents in Appendix IX and will be utilizing the following SW-846 procedures listed in Table 1. As such, the enclosed Organic Region I Data Validation Worksheets have been modified accordingly for each fraction to conform to the QA/QC criteria of each SW-846 test methods in Table 1.

TABLE 1

SELECTED ANALYTICAL METHODS FOR ORGANIC APPENDIX IX ANALYSES

SW-846 Method	General Category/ Analyte	Technique	Number of Analytes Measured
8080	Organochlorine Pesticides and PCBs	GC/ECD	28
8140	Organophosphorus Pesticides	GC/FPD	9
8150	Herbicides	GC/ECD	4
8240	Volatile Organics	GC/MS	*54
8270	Semivolatile Organics	GC/MS	**111
8280	Dioxins and Furans	GC/MS	12
		TOTAL	218

GC/ECD - Gas Chromatography/Electron Capture Detection
GC/EPD - Gas Chromatography/Flame Photometric Detection
GC/MS - Gas Chromatography/Mass Spectrometry

* This number includes three analytes (1,4-Dioxane, isobutanol, methacrylonitrile) that will be analyzed by Method 8240 Direct Injection.

** This number includes Appendix IX analytes, however, this number will increase based on site specific compounds that will be analyzed by Method 8270, also. Sym-Trinitrobenzene will be analyzed as a tentatively identified compound due to unavailability of standard.

ORGANIC

SUMMARY TABLES

DATA SUMMARY FORM: V O L A T I L E S 1

Appendix IX

WATER SAMPLES

(µg/L)

Site Name: _____

Case #: _____ Sampling Date(s): _____

To calculate sample quantitation limit:
(~~CRQL~~ PQL * Dilution Factor)

PQL ~~CRQL~~	COMPOUND	Sample No.																	
		Dilution Factor																	
		Location																	
		Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
10	Chloromethane																		
10	Bromomethane																		
10	*Vinyl Chloride																		
10	Chloroethane																		
10	*Methylene Chloride																		
100	Acetone																		
5	Carbon Disulfide																		
5	*1,1-Dichloroethene																		
5	1,1-Dichloroethane																		
5	*Total 1,2-Dichloroethene																		
5	Chloroform																		
5	*1,2-Dichloroethane																		
100	*2-Butanone (NEK)																		
5	*1,1,1-Trichloroethane																		
5	*Carbon Tetrachloride																		
10	Vinyl Acetate																		
5	Bromodichloromethane																		
75	ACROLEIN																		
50	ACRYLONITRILE																		
20	ACETONITRILE																		
5	3-CHLOROPROPENE																		
25	2-CHLORO-1,3-BUTADIENE																		
10,000	1,4-DIOXANE																		
20	DICHLORODIFLUOROMETHANE																		

~~CRQL = Contract Required Quantitation Limit~~

PQL = Practical Quantitation Limit

Q = data validation qualifiers

* Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS

revised 07/90

Prepared by: JPL (Woodward-Clyde)

Page ____ of ____

DATA SUMMARY FORM: VOLATILES 2

Appendix IX

WATER SAMPLES

(µg/L)

Site Name: _____

Case #: _____ Sampling Date(s): _____

To calculate sample quantitation limit:
(~~CRQL~~ PQL * Dilution Factor)

	Sample No.																			
	Dilution Factor																			
	Location																			
~~CRQL~~ PQL	COMPOUND	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q
5	*1,2-Dichloropropane																			
5	Cis-1,3-Dichloropropane																			
5	Trichloroethene																			
5	Dibromochloromethane																			
5	1,1,2-Trichlorethane																			
5	*Benzene																			
5	Trans-1,3-Dichloropropene																			
5	Bromoform																			
~~50~~ 10	4-Methyl-2-pentanone																			
~~50~~ 10	2-Hexanone																			
5	*Tetrachloroethene																			
5	1,1,2,2-Tetrachloroethane																			
5	*Toluene																			
5	*Chlorobenzene																			
5	*Ethylbenzene																			
5	*Styrene																			
5	*Total Xylenes																			
5	TRANS-1,2-DICHLOROETHENE																			
10	1,2-DIBROMOETHANE																			
10	TRANS-1,4-DICHLORO-2-BUTENE																			
~~20~~	1,2-DIBROMO-3-CHLOROPROPANE																			
10	ETHYL METHACRYLATE																			
5	IODOMETHANE																			
10,000	ISOBUTANOL																			

~~CRQL~~ = ~~Contract Required Quantitation Limit~~

PQL = Practical Quantitation Limit

Q = Data Validation qualifier

*Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS

revised 07/90
10

Prepared by: JPL (Woodward-Clyde)

VOLATILE

DATA SUMMARY FORM: ORGANICS 3

Appendix IX

WATER SAMPLES

(µg/L)

Site Name: _____

Case #: _____ **Sampling Date(s):** _____

To calculate sample quantitation limit:
(PQL * Dilution Factor)

PQL	Compound	Sample NO.								
		Dilution Factor								
		Location								
10	METHYL METHACRYLATE									
5	1,2,3-TRICHLOROPROPANE									
10,000	METHACRYLONITRILE									
100	PROPANENITRILE									
10	TRICHLOROFLUOROMETHANE									

PQL = Quantitation Limit
PRACTICAL

Q = data validation qualifier

SEE NARRATIVE FOR CODE DEFINITIONS

revised 07/90
10

DATA SUMMARY FORM: V O L A T I L E S 1

Appendix IX

SOIL SAMPLES

(µg/Kg)

Site Name: _____

Case #: _____ Sampling Date(s): _____

To calculate sample quantitation limit:

(~~CRQL~~ PQL * Dilution Factor) / ((100 - % moisture)/100)

	Sample No.																			
	Dilution Factor																			
	% Moisture																			
	Location																			
PQL ~~CRQL~~	COMPOUND	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q
~~200~~ 10	Chloromethane																			
~~200~~ 10	Bromomethane																			
~~200~~ 10	Vinyl Chloride																			
~~200~~ 10	Chloroethane																			
200 5	Methylene Chloride																			
~~1000~~ 10	Acetone																			
100 5	Carbon Disulfide																			
100 5	1,1-Dichloroethene																			
100 5	1,1-Dichloroethane																			
100 5	~~total~~ trans 1,2-Dichloroethene																			
100 5	Chloroform																			
100 5	1,2-Dichloroethane																			
~~2000~~ 10	2-Butanone (MEK)																			
100 5	1,1,1-Trichloroethane																			
100 5	Carbon Tetrachloride																			
100 10	Vinyl Acetate																			
100 5	Bromodichloromethane																			
1500	ACROLEIN																			
1000	ACRYLONITRILE																			
400	ACETONITRILE																			
100	3-CHLOROPROPENE																			
500	2-CHLORO-1,3-BUTADIENE																			
10,000	1,4-DIOXANE																			
400	DICHLOROFLUOROMETHANE																			

~~CRQL~~ = ~~Contract Required Quantitation Limit~~

PQL = Practical Quantitation Limits (wet-weight basis): samples results on a dry weight basis will yield higher PQL (refer to calculation: top right)

SEE NARRATIVE FOR CODE DEFINITIONS

Q = data validation qualifiers

revised 07/90

10

Prepared by: JPL/Woodward-Cl.

DATA SUMMARY FORM: V O L A T I L E S 2

Appendix IX

SOIL SAMPLES

(µg/Kg)

Site Name: _____

Case #: _____ Sampling Date(s): _____

To calculate sample quantitation limit:

(~~CRQL~~ PQL * Dilution Factor) / ((100 - % moisture)/100)

	Sample No.																			
	Dilution Factor																			
	% Moisture																			
	Location																			
PQL ~~CRQL~~	COMPOUND	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q
100 µg	1,2-Dichloropropane																			
100 µg	Cis-1,3-Dichloropropene																			
100 µg	Trichloroethene																			
100 µg	Dibromochloromethane																			
100 µg	1,1,2-Trichloroethane																			
100 µg	Benzene																			
100 µg	Trans-1,3-Dichloropropene																			
100 µg	Bromoform (TRIBROMOMETHANE)																			
1000 µg	4-Methyl-2-pentanone																			
1000 µg	2-Hexanone																			
100 µg	Tetrachloroethene																			
100 µg	1,1,2,2,-Tetrachloroethane																			
100 µg	Toluene																			
100 µg	Chlorobenzene																			
100 µg	Ethylbenzene																			
100 µg	Styrene																			
100 µg	Total Xylenes																			
100	TRANS-1,2-DICHLOROETHENE																			
200	1,2-DIBROMOETHANE																			
200	TRANS-1,4-DICHLORO-2-BUTENE																			
100	1,2-DIBROMO-3-CHLOROPROPANE																			
200	ETHYL METHACRYLATE																			
100	IODOMETHANE																			
10,000	ISOBUTANOL																			

~~CRQL~~ = Contract Required Quantitation ~~Limit~~

PQL = Practical Quantitation Limit (wet-weight basis); sample results on a dry weight basis will yield a higher PQL (refer to calculation: top right)

Q = Data Validation Qualifier

SEE NARRATIVE FOR CODE DEFINITIONS

revised 07/90

VOLATILE

DATA SUMMARY FORM: ORGANICS 3

Appendix IX

SOIL SAMPLES

(µg/Kg)

ite Name: _____

ase #: _____ Sampling Date(s): _____

To calculate sample quantitation limit:

(QL * Dilution Factor) / ((100 - % moisture)/100)

P

	Sample No.									
	Dilution Factor									
	% Moisture									
	Location									
PQL	COMPOUND	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q
200	METHYL METHACRYLATE									
100	1,2,3-TRICHLOROPROPANE									
10,000	METHACRYLONITRILE									
2,000	PROPANENITRILE									
200	TRICHLOROFLUOROMETHANE									

PQL = Quantitation Limit

PRACTICAL

Q = data validation qualifier

SEE NARRATIVE FOR CODE DEFINITION:

revised 07/90

10

DATA SUMMARY FORM: B N A S 1

Site Name: _____

Case #: _____ Sampling Date(s): _____

WATER SAMPLES
(µg/L)

To calculate sample quantitation limit:
(~~CRQL~~ PQL * Dilution Factor)

PQL ~~CRQL~~	COMPOUND	Sample No.																			
		Dilution Factor																			
		Location																			
		conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q
10	Phenol																				
10	bis(2-Chloroethyl)ether																				
10	2-Chlorophenol																				
10	*1,3-Dichlorobenzene																				
10	*1,4-Dichlorobenzene																				
10	Benzyl Alcohol																				
10	1,2-Dichlorobenzene																				
10	2-Methylphenol (o-cresol)																				
10	bis(2-Chloroisopropyl)ether																				
10	4-Methylphenol (p-cresol)																				
10	N-Nitroso-di-n-propylamine																				
10	Hexachloroethane																				
10	Nitrobenzene																				
10	Isophorone																				
10	2-Nitrophenol																				
10	2,4-Dimethylphenol																				
~~50~~	~~Benzoic Acid~~																				
10	bis(2-Chloroethoxy)methane																				
10	2,4-Dichlorophenol																				
10	1,2,4-Trichlorobenzene																				
10	Naphthalene																				
10	4-Chloroaniline																				
10	ACETOPHENONE																				
50	ANILINE																				

~~CRQL~~ PQL = ~~Contract Required~~ PRACTICAL Quantitation Limit

* Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS

revised ~~07~~ 10/90

Q = Data Validation Qualifier

Prepared by: John Lorenzo (WCC)

DATA SUMMARY FORM: B N A S - 2

Site Name: _____

Case #: _____ Sampling Date(s): _____

WATER SAMPLES
(µg/L)

To calculate sample quantitation limit:
(~~CRQL~~ PQL * Dilution Factor)

PQL ~~CRQL~~	COMPOUND	Sample No.																	
		Dilution Factor																	
		Location																	
		conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q
10	Hexachlorobutadiene																		
10	4-Chloro-3-methylphenol																		
10	2-Methylnaphthalene																		
10	Hexachlorocyclopentadiene																		
10	2,4,6-Trichlorophenol																		
50	2,4,5-Trichlorophenol																		
10	2-Chloronaphthalene																		
50	2-Nitroaniline																		
10	Dimethylphthalate																		
10	Acenaphthylene																		
10	2,6-Dinitrotoluene																		
50	3-Nitroaniline																		
10	Acenaphthene																		
50	2,4-Dinitrophenol																		
50	4-Nitrophenol																		
10	Dibenzofuran																		
10	2,4-Dinitrotoluene																		
10	Diethylphthalate																		
10	4-Chlorophenyl-phenylether																		
10	Fluorene																		
50	4-Nitroaniline																		
50	4,6-Dinitro-2-methylphenol																		
50	4-AMINOBIPHENYL																		
50	2-ACETYLAMINOFLUORENE																		

~~CRQL~~ PQL = ~~Contract Required~~ Quantitation Limit
PRACTICAL

Q = Data Validation Qualifier

SEE NARRATIVE FOR CODE DEFINITIONS
revised ~~07~~ 10/90

Prepared by: John Lorenzo (WCC)

DATA SUMMARY FORM: B N A S . 3

Site Name: _____

Case #: _____ Sampling Date(s): _____

WATER SAMPLES
(µg/L)

To calculate sample quantitation limit:
(~~CRQL~~ PQL * Dilution Factor)

PQL ~~CRQL~~	COMPOUND	Sample No.									
		Dilution Factor									
		Location									
		conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q
10	N-Nitrosodiphenylamine										
10	4-Bromophenyl-phenylether										
10	*Hexachlorobenzene										
50	*Pentachlorophenol										
10	Phenanthrene										
10	Anthracene										
10	Di-n-butylphthalate										
10	Fluoranthene										
10	Pyrene										
10	Butylbenzylphthalate										
20	3,3'-Dichlorobenzidine										
10	Benzo(a)anthracene										
10	Chrysene										
10	bis(2-Ethylhexyl)phthalate										
10	Di-n-octylphthalate										
10	Benzo(b)fluoranthene										
10	Benzo(k)fluroanthene										
10	Benzo(a)pyrene										
10	Indeno(1,2,3-cd)pyrene										
10	Dibenz(a,h)anthracene										
10	Benzo(g,h,i)perylene										
100	ARAMITE										
10	CHLOROBENZILATE										
10	DIMETHYLPHENETHYLAMINE										

~~CRQL~~ = ~~Contract Required~~ Quantitation Limit
PQL Practical

*Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS

Q = Data Validation Qualifier

revised ~~07~~/90
10

Prepared by: John Lorenzo (wcc)

BNA

DATA SUMMARY FORM: ORGANICS 4

WATER SAMPLES
(µg/L)

Site Name: _____

Case #: _____ **Sampling Date(s):** _____

To calculate sample quantitation limit:
(QL * Dilution Factor)

PQL	Compound	Sample No. / Dilution Factor / Location — conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q
10	2,6-DICHLOROPHENOL																		
10	1,3-DINITROBENZENE																		
10	DIPHENYLAMINE																		
30	P-DIMETHYLAMINOAZOBENZENE																		
80	3,3'-DIMETHYLBENZIDINE																		
50	7,12-DIMETHYLBENZ(A)ANTHRACENE																		
10	DIALLATE																		
10	ETHYL METHANESULFONATE																		
50	HEXACHLOROPROPENE																		
50	HEXACHLOROPHENE																		
10	ISOSAFROLE																		
50	METHYL METHANESULFONATE																		
10	3-METHYLPHENOL(M-CRESOL)																		
40	METHAPYRILINE																		
30	3-METHYLCHOLANTHRENE																		
10	N-NITROSODIMETHYLAMINE																		
10	N-NITROSOMETHYLETHYLAMINE																		
10	N-NITROSODIETHYLAMINE																		
10	N-NITROSOPYRROLIDINE																		
10	N-NITROSOMORPHOLINE																		
10	N-NITROSOPIPERIDINE																		
20	N-NITROSO-DI-N-BUTYLAMINE																		
10	1,4-NAPTHOQUINONE																		
20	1-NAPHTHYLAMINE																		

QL = Quantitation Limit
Practical

Q = Data Validation Qualifier

SEE NARRATIVE FOR CODE DEFINITIONS
revised 07/90
10

Page ____ of ____

BNA

DATA SUMMARY FORM: ORGANICS 5

WATER SAMPLES
(µg/L)

Site Name: _____

Case #: _____ Sampling Date(s): _____

To calculate sample quantitation limit:
(QL * Dilution Factor)

PQL	Compound	Sample Number									
		Dilution Factor									
		Location									
		conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q
660	2-NAPHTHYLAMINE																				
660	5-NITRO-O-TOLUIDINE																				
3000	4-NITROQUINOLINE-N-OXIDE																				
660	PYRIDINE																				
2300	2-PICOLINE																				
330	PENTACHLOROETHANE																				
660	PENTACHLOROBENZENE																				
330	PHENACETIN																				
660	PENTACHLORONITROBENZENE																				
1000	PRONAMIDE																				
1700	P-PHENYLENEDIAMINE																				
330	SAFROLE																				
330	O-TOLUIDINE																				
330	1,2,4,5-TETRACHLOROBENZENE																				
660	2,3,4,6-TETRACHLOROPHENOL																				
	TINUVIN 327																				
	IRGASAN DP-300																				
	PROPAZINE																				
	BUTAZOLIDIN																				
	TOFRANIL																				
	DCDD																				
	TRCDD																				
	DCDF																				
	TRCDF																				
	SYN-TRINITROBENZENE		J		J		J		J		J		J		J		J		J		J

PQL = Quantitation Limit

Q = Data Validation Qualifier

NOTE: SYN-TRINITROBENZENE WAS ANALYZED AS A TENTATIVELY IDENTIFIED COMPOUND DUE TO THE UNAVAILABILITY OF STANDARDS

SEE NARRATIVE FOR CODE DEFINITIONS

revised 07/90

Page ____ of ____

DATA SUMMARY FORM: B N A S 1

Site Name: _____

Case #: _____ Sampling Date: _____

SOIL SAMPLES
(µg/Kg)

To calculate sample quantitation limit:
(~~CRQL~~ PQL * Dilution Factor) / ((1 - % moisture)/100)

	Sample No.									
	Dilution Factor									
	% Moisture									
	Location									
~~CRQL~~ PQL	COMPOUND	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q
330	Phenol									
330	bis(2-Chloroethyl)ether									
330	2-Chlorophenol									
330	1,3-Dichlorobenzene									
330	1,4-Dichlorobenzene									
330	Benzyl Alcohol									
330	1,2-Dichlorobenzene									
330	2-Methylphenol (o-cresol)									
330	bis(2-Chloroisopropyl)ether									
330	4-Methylphenol									
330	N-Nitroso-di-n-propylamine									
330	Hexachloroethane									
330	Nitrobenzene									
330	Isophorone									
330	2-Nitrophenol									
330	2,4-Dimethylphenol									
~~1600~~	~~Benzoic Acid~~									
330	bis(2-Chloroethoxy)methane									
330	2,4-Dichlorophenol									
330	1,2,4-Trichlorobenzene									
330	Naphthalene									
330	4-Chloroaniline									
330	ACETOPHENONE									
1700	ANILINE									

~~CRQL~~ PQL = ~~Contract Required~~ Practical Quantitation Limit

SEE NARRATIVE FOR CODE DEFINITIONS
revised 07/90

Prepared by: John Lorenzo (WCC)
10

DATA SUMMARY FORM: B N A S . 2

Site Name: _____

Case #: _____ Sampling Date(s): _____

SOIL SAMPLES
(µg/Kg)

To calculate sample quantitation limit:
(~~CRQL~~ PQL * Dilution Factor) / ((100 - % moisture)/100)

~~CRQL~~ PQL	COMPOUND	Sample No.									
		Dilution Factor									
		% Moisture									
		Location									
		conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q
330	Hexachlorobutadiene										
330	4-Chloro-3-methylphenol										
330	2-Methylnaphthalene										
330	Hexachlorocyclopentadiene										
330	2,4,6-Trichlorophenol										
~~1600~~ 1700	2,4,5-Trichlorophenol										
330	2-Chloronaphthalene										
1600	2-Nitroaniline										
330	Dimethylphthalate										
330	Acenaphthylene										
330	2,6-Dinitrotoluene										
~~1600~~ 1700	3-Nitroaniline										
330	Acenaphthene										
~~1600~~ 1700	2,4-Dinitrophenol										
~~1600~~ 1700	4-Nitrophenol										
330	Dibenzofuran										
330	2,4-Dinitrotoluene										
330	Diethylphthalate										
330	4-Chlorophenyl-phenylether										
330	Fluorene										
~~1600~~ 1700	4-Nitroaniline										
~~1600~~ 1700	4,6-Dinitro-2methylphenol										
1700	4-AMINOBIPHENYL										
1700	2-ACETYLAMINOFLUORENE										

~~CRQL~~ = ~~Contract Required Quantitation Limit~~
PQL = Practical Quantitation Limit
Q = Data Validation Qualifier

SEE NARRATIVE FOR CODE DEFINITIONS
revised ~~07~~/90
10

Prepared by: John Lorenzo (WCC)

DATA SUMMARY FORM: B N A S 3

Site Name: _____

Case #: _____ Sampling Date(s): _____

SOIL SAMPLES
(µg/Kg)

To calculate sample quantitation limit:
(~~CRQL~~ PQL * Dilution Factor) / ((100 - % moisture)/100)

	Sample No.									
	Dilution Factor									
	% Moisture									
	Location									
~~CRQL~~ PQL	COMPOUND	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q
330	N-Nitrosodiphenylamine									
330	4-Bromophenyl-phenylether									
330	Hexachlorobenzene									
1600	Pentachlorophenol									
330	Phenanthrene									
330	Anthracene									
330	Di-n-butylphthalate									
330	Fluoranthene									
330	Pyrene									
330	Butylbenzylphthalate									
660	3,3'-Dichlorobenzidine									
330	Benzo(a)anthracene									
330	Chrysene									
330	bis(2-Ethylhexyl)phthalate									
330	Di-n-octylphthalate									
330	Benzo(b)fluoranthene									
330	Benzo(k)fluoranthene									
330	Benzo(a)pyrene									
330	Indeno(1,2,3-cd)pyrene									
330	Dibenz(a,h)anthracene									
330	Benzo(g,h)perylene									
3000	ARAMITE									
330	CHLOROBENZILATE									
330	DIMETHYLPHENETHYLAMINE									

~~CRQL~~ = ~~Contract Required Quantitation Limit~~
PQL = Practical Quantitation Limit
Q = Data Validation Qualifier

SEE NARRATIVE FOR CODE DEFINITIONS
revised 07/90
10

Prepared by: John Lorenzo (WCC)

BNA

DATA SUMMARY FORM: O R G A N I C S 4

SOIL SAMPLES
(µg/Kg)

Site Name: _____

Case #: _____ **Sampling Date(s):** _____

To calculate sample quantitation limit:
(QL * Dilution Factor) / ((100 - % moisture)/100)

P

PQL	Compound	Sample Number									
		Dilution Factor									
		Location									
		% moisture									
		conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q
330	2,6-DICHLOROPHENOL										
330	1,3-DINITROBENZENE										
330	DIPHENYLAMINE										
1000	P-DIMETHYLAMINOAZOBENZENE										
2700	3,3'-DIMETHYLBENZIDINE										
1700	7,12-DIMETHYLBENZ(A)ANTHRACENE										
330	DIALLATE										
330	ETHYL METHANESULFONATE										
1700	HEXACHLOROPROPENE										
1700	HEXACHLOROPHENE										
330	ISOSAFROLE										
1700	METHYL METHANESULFONATE										
330	3-METHYLPHENOL(M-CRESOL)										
1300	METHAPYRILINE										
1000	3-METHYLCHOLANTHRENE										
330	N-NITROSODIMETHYLAMINE										
330	N-NITROSOMETHYLETHYLAMINE										
330	N-NITROSODIETHYLAMINE										
330	N-NITROSOPYRROLIDINE										
330	N-NITROSOMORPHOLINE										
330	N-NITROSOPIPERIDINE										
660	N-NITROSO-DI-N-BUTYLAMINE										
330	1,4-NAPHOQUINONE										
660	1-NAPHTHYLAMINE										

SEE NARRATIVE FOR CODE DEFINITION

revised 07/9
10

PQL = Quantitation Limit
Practical

Q = Data Validation Qualifier

Page ____ of ____

BNA

DATA SUMMARY FORM: ORGANICS 5

Site Name: _____

Case #: _____ Sampling Date(s): _____

SOIL SAMPLES
(µg/Kg)

To calculate sample quantitation limit:
(QL * Dilution Factor) / ((100 - % moisture)/100)
P

	Sample Number																			
	Dilution Factor																			
	Location																			
	% Moisture																			
PQL	Compound	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	
20	2-NAPHTHYLAMINE																			
20	5-NITRO-O-TOLUIDINE																			
100	4-NITROQUINOLINE-N-OXIDE																			
20	PYRIDINE																			
70	2-PICOLINE																			
20	PENTACHLOROETHANE																			
20	PENTACHLOROBENZENE																			
10	PHENACETIN																			
20	PENTACHLORONITROBENZENE																			
30	PRONAMIDE																			
50	P-PHENYLENEDIAMINE																			
10	SAFROLE																			
10	O-TOLUIDINE																			
10	1,2,4,5-TETRACHLOROBENZENE																			
20	2,3,4,6-TETRACHLOROPHENOL																			
	TINUVIN 327																			
	IRGASAN DP-300																			
	PROPAZINE																			
	BUTAZOLIDIN																			
	TOFRANIL																			
	DCDD																			
	TRCDD																			
	DCDF																			
	TRCDF																			
	SYN-TRINITROBENZENE		J		J		J		J		J		J		J		J		J	

SEE NARRATIVE FOR CODE DEFINITIONS

QL = Quantitation Limit

PQL PRACTICAL

Q = Data Validation Qualifier

NOTE: SYN-TRINITROBENZENE WAS ANALYZED AS A TENTATIVELY IDENTIFIED COMPOUND DUE TO THE UNAVAILABILITY OF STANDARDS

DATA SUMMARY FORM: PESTICIDES AND PCB'S 1
DIOXINS / CLASSICAL PARAMETERS
WATER SAMPLES
(µg/L)

Site Name: _____

Case #: _____ **Sampling Date(s):** _____

To calculate sample quantitation limit:
(CRQL * Dilution Factor)
PQL

PQL CRQL	COMPOUND	Sample No.																					
		Dilution Factor																					
		Location																					
			conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q
0.05	alpha-BHC																						
0.05	beta-BHC																						
0.05	delta-BHC																						
0.05	*gamma-BHC (Lindane)																						
0.05	*Heptachlor																						
0.05	Aldrin																						
0.05	Heptachlor Epoxide																						
0.05	Endosulfan I																						
0.10	Dieldrin																						
0.10	4,4'-DDE																						
0.10	*Endrin																						
0.10	Endosulfan II																						
0.10	4,4'-DDD																						
0.10	Endosulfan Sulfate																						
0.10	4,4'-DDT																						
0.50	*Methoxychlor																						
~~0.10~~	~~Endrin Ketone~~																						
0.50	*alpha-Chlordane																						
0.50	*gamma-Chlordane																						
1.0	*Toxaphene																						
0.50	*Aroclor-1016																						
0.50	*Aroclor-1221																						
0.50	*Aroclor-1232																						
0.50	*Aroclor-1242																						
0.50	*Aroclor-1248																						
1.0	*Aroclor-1254																						
1.0	*Aroclor-1260																						

~~CRQL~~ = ~~Contract Required~~ Quantitation Limit
PQL Practical

Q = Data Validation Qualifier

*Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS
revised 07/90
10

ORGANOCHLORINE PESTICIDE/PCB

Page ____ of ____

DATA SUMMARY FORM: ORGANICS 2

Site Name: _____

Case #: _____ Sampling Date(s): _____

Reference

WATER SAMPLES
(µg/L)

To calculate sample quantitation limit:
(PQL * Dilution Factor)

	Sample No.																	
	Dilution Factor																	
	Location																	
PQL	Compound	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
16	ENDRIN ALDEHYDE																	
1600	ISODRIN																	
1600	KEPONE																	
0.5	SULFOTEPP																	
2	PHORATE																	
25	DIMETHOATE																	
2	DISULFOTON																	
0.5	METHYL PARATHION																	
0.5	ETHYL PARATHION																	
1.0	FAMPHUR																	
1.0	THIONAZIN																	
1.0	0,0,0-TRIETHYLPHOSPHOROTHIOATE																	
0.005	2,3,7,8-TCDD																	
0.01	PCDDs																	
0.01	PCDFs																	
10	CYANIDE																	
1000	SULFIDE																	

PQL = Practical Quantitation Limit

Q = Data Validation Qualifier

SEE NARRATIVE FOR CODE DEFINITIONS

revised 07/90
10

DATA SUMMARY FORM: P E S T I C I D E S A N D P C B ' S 1

Site Name: _____

Case #: _____ Sampling Date(s): _____

SOIL SAMPLES
(µg/Kg)

~~CRQL~~ PQL To calculate sample quantitation limit:
(~~CRQL~~ PQL * Dilution Factor) / ((100 - % moisture)/100)

PQL ~~CRQL~~	COMPOUND	Sample No. / Dilution Factor / Location: conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q	conc.	Q
8	alpha-BHC																		
8	beta-BHC																		
8	delta-BHC																		
8	gamma-BHC (Lindane)																		
8	Heptachlor																		
8	Aldrin																		
8	Heptachlor Epoxide																		
8	Endosulfan I																		
16	Dieldrin																		
16	4,4'-DDE																		
16	Endrin																		
16	Endosulfan II																		
16	4,4'-DDD																		
16	Endosulfan Sulfate																		
16	4,4'-DDT																		
80	Methoxychlor																		
~~16~~	~~Endrin Ketone~~																		
~~8~~ 16	alpha-Chlordane																		
~~8~~ 16	gamma-Chlordane																		
160	Toxaphene																		
80	Aroclor-1016																		
80	Aroclor-1221																		
80	Aroclor-1232																		
80	Aroclor-1242																		
80	Aroclor-1248																		
160	Aroclor-1254																		
160	Aroclor-1260																		

~~CRQL~~ PQL = ~~Contract Required~~ PRACTICAL Quantitation Limit

Q = Data Validation Qualifier

SEE NARRATIVE FOR CODE DEFINITIONS

revised ~~07~~ 10/90

ORGANOCHLORINE PESTICIDE/PCB

Page ___ of ___

20 of 20

DATA SUMMARY FORM: ORGANICS 2

SOIL SAMPLES
(µg/Kg)

Site Name: _____

Case #: _____ **Sampling Date(s):** _____
Reference

To calculate sample quantitation limit:
(QL * Dilution Factor) / ((100 - % moisture)/100)
P

	Sample No.									
	Dilution Factor									
	Location									
PQL	Compound	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q	conc. Q
0.1	ENDRIN ALDEHYDE									
10	ISODRIN									
10	KEPONE									
200	SULFOTEPP									
200	PHORATE									
200	DIMETHOATE									
200	DISULFOTON									
200	METHYL PARATHION									
200	ETHYL PARATHION									
1000	FAMPHUR									
1000	THIONAZIN									
1000	O,O,O-TRIETHYLPHOSPHOROTHIOATE									
2.0	2,3,7,8-TCDD									
5.0	PCDDs									
5.0	PCDFs									
500	CYANIDE									
2000	SULFIDE									

PQL = Quantitation Limit
Practical

Q = Data Validation Qualifier

SEE NARRATIVE FOR CODE DEFINITIONS

revised 07/90
10

CIBA-GEIGY, Cranston, Rhode Island Reference No.:
REGION I
Data Review Worksheets
Re-Edited for Appendix IX
Constituent Analysis

REGION I REVIEW OF ORGANIC CONTRACT LABORATORY DATA PACKAGE

The hardcopied (laboratory name) _____ data package received at Region I has been reviewed and the quality assurance and performance data summarized. The data review included:

Matrix:
No. of Samples:
Trip Blank No.:
Equipment Blank No.:
Field Dup Nos.:
Sampling Date(s):
Shipping Date(s):
Date Rec'd by Lab:
Sample Identifiers:

SW-846 (3rd Edition) requires that specific analytical work be done. The general criteria used to determine the performance were based upon an examination of:

-Data Completeness
-Holding Times
-GC/MS Tuning
-Calibrations
-Blanks
-Surrogate Recoveries
-Matrix Spike/Matrix Spike Dup
-Field Duplicates
-Internal Standard Performance
-Pesticide Inst. Performance
-Compound Identification
-Compound Quantification

Overall Comments:

Definitions and Qualifiers:

A - Acceptable data.
J - Approximate data due to quality control criteria.
R - Reject data due to quality control criteria
U - Analyte not detected

Reviewer: Date:

REGION I
Data Review Worksheets

I. DATA COMPLETENESS

MISSING INFORMATION	DATE LAB CONTACTED	DATE REC'D

II. HOLDING TIMES — Complete table for all samples and circle the fractions which are not within criteria.

SAMPLE ID	DATE SAMPLED	VOA DATE ANAL	BNA DATE EXTR	BNA DATE ANAL	PEST DATE EXTR	PEST DATE ANAL

In accordance with Table 4-1 of Section 4.0 SW-846 and EPA Region I protocols the holding time criteria and action levels are:

VOA - Unpreserved: Aromatic within 7 days, non-aromatic within 14 days of sample collection.
Preserved: Both within 14 days of sample collection.
Soils: Both within 14 days of sample collection.

BNA & PEST - Water: Extracted within 7 days, analyzed within 40 days.
Soils (Solids): Extracted within 14 days, analyzed within 40 days.

ACTION:
1. If holding times are exceeded, all positive results are estimate (J) and non-detects are estimated (UJ).
2. If holding times are grossly exceeded, the reviewer may determine that non-detects are also unusable.

III. GC/MS TUNING

The DFTPP performance results were reviewed and found to be with the specified criteria.

If no,
Samples affected:

The BFB performance results were reviewed and found to be within the specified criteria.

If no,
Samples affected:

If mass calibration is in error refer to the Region guidelines for expanded criteria. If necessary, qualify all associated data as unusable (R).

Note: The data reviewer must realize that the BFB and DFTPP tune criteria for CLP and SW846 protocols are the same.

REGION I
Data Review Worksheet

IV A. VOLATILE CALIBRATION VERIFICATION

Date of Initial Calibration :
Dates of Continuing Calibrations:
Instrument ID :
Matrix/Level :

DATE	CRITERIA OUT RF,%RSD,RF,%D	COMPOUND (VALUE)
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	

1. All RF's must be >0.05
2. All %RSD's must be <30%
3. All %D's must be <25%

ACTION:

1. If any compound has an initial RF or a continuing RF of <0.05:
   a. Flag positive results for that compound as estimated (J).
   b. Flag non-detects for that compound as unusable (R).

2. If any compound has a %RSD >30% or a %D >25% for volatiles and >30% for semivolatiles:
   a. Flag positive results for that compound as estimate (J).
   b. Flag non-detects for that compound as estimated (UJ) if the %RSD or %D is >50%.

A separate worksheet should be filled out for each initial curve.

REGION I
Data Review Worksheet

IV B. SEMIVOLATILE CALIBRATION VERIFICATION

Date of Initial Calibration :
Dates of Continuing Calibrations :
Instrument ID :

DATE	CRITERIA OUT RF,%RSD,RF,%D	COMPOUND (VALUE)
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	
____	Samples Affected:	

See worksheet IV-A for criteria and actions.

A new worksheet should be filled out for each initial curve.

V A. BLANK ANALYSIS RESULTS (Sections 1 & 2)

List the contamination in the blanks below.

1. Laboratory Blanks
CONCENTRATION LEVEL:_____ (low or medium)*

DATE	LAB ID	FRACTION/ MATRIX	COMPOUND	CONCENTRATION/ UNITS

2. Equipment (Field) and Trip Blanks

DATE	LAB ID	FRACTION/ MATRIX	COMPOUND	CONCENTRATION/ UNITS

*A separate worksheet should be used for low and medium level blanks.

V B. BLANK ANALYSIS RESULTS (Section 3)

3. Blank actions

Action levels should be based upon the highest concentration of contaminant determined in any blank. The action level for samples which have been concentrated or diluted should be multiplied by the concentration/dilution factor. No positive sample result should be reported unless the concentration of the compound in the sample exceeds the action level of 10 x's the amount for any other compound. Specific actions are as follows:

1. The concentration is less than the CRQL, report the CRQL.

2. The concentration is greater than the CRQL, but less than the action level, report the concentration found U.

3. The concentration is greater that the action level, report the concentration unqualified.

For examples refer to the Regional Guidelines.

Common contaminants = methylene chloride, acetone, 2-butanone, toluene, and base-neutral fraction phthalate ester compounds (i.e., bis(2-ethyl hexyl)phthalate.

LEVEL:_____

COMPOUND	MAX. CONC./ UNITS	ACTION LEVEL/ UNITS	CRQL

A separate worksheet should be used for low and medium level blanks.

VI. SURROGATE SPIKE RECOVERIES

List the percent recoveries which do not meet the criteria for surrogate recovery.

Matrix: _____

TR #'S	TOL	VOA 4-BFB	DCE	NBZ	B/N FBP	TPH	PHL	A 2FP	TBP	PEST DBC*
QC Limits (WATERS)	88 to 110	86 to 115	76 to 114	35 to 114	43 to 116	33 to 141	30 to 94	21 to 100	10 to 123	24 to 154
(SOLIDS)	84 to 138	59 to 113	70 to 121	23 to 120	30 to 115	18 to 137	24 to 113	25 to 121	19 to 122	20 to 150

*The DBC windows are advisory only
Surrogate Actions:

	PERCENT RECOVERY		
	<10%	10%-(MIN)	>R(MAX)
Positive sample results	J	J	J
Non-detected results	R	UJ	A

R(MIN): Denotes lower limit of surrogate recovery range window (i.e., TOL which denotes the VOA surrogate spiking standard toluene -d8) has R(MIN) of 88% for a water matrix sample and a R(MAX) of 110. The acceptance window is therefore 88-110%.
Surrogate action should be applied:

1. If at least two surrogates in a B/N or A fraction or one surrogate in the VOA fraction are out of specification, but have recoveries of >10%.
2. If any one surrogate in a fraction shows <10% recovery.

REGION I
Data Review Worksheets

VII A. MATRIX SPIKE/MATRIX SPIKE DUPLICATE

1. Matrix Spike/Matrix Spike Duplicate Recoveries and Precision

TR Nos. _____, _____ Level: _____ Matrix: _____

List the percent recoveries and RPD's of compounds which do not meet the criteria stated in SW-846. Radian Corporation (the laboratory) must supply the new SW-846 percent recoveries and RPD maximums on a EPA Form III. Contact Radian Corporation (the laboratory) if the revised Form III is not present.

FRACTION/ MS OR MSD	%REC/ COMPOUND	% REC/RPD QC LIMITS

QUALIFICATION IS LIMITED TO THE UNSPIKED SAMPLE ONLY.

1. If any compound does not meet the recovery range, follow the actions stated below:

	PERCENT RECOVERY		
	<10%	10%-R(MIN)	>R(MAX)
Positive sample results	J	J	J
Non-detected results	R	UJ	A

R(MIN): Denotes lower limit of matrix spike recovery range window (i.e., trichloroethene (water matrix): 71%). R(MAX) for trichloroethene (water matrix) is 120% The acceptance window is therefore 71-120%.

2. If any compound does not meet the RPD criteria, flag positive results for that compound as estimated (J).

A separate worksheet should be used for each MS/MSD pair.

Refer to Appendix A for matrix spike percent RPD maximums and percent recoveries.

VII B. MATRIX SPIKE/MATRIX SPIKE DUPLICATE (Section 2)

3. Matrix Spike Duplicate - Unspiked Compounds

TR Nos. _____, _____

List the concentrations of the unspiked compounds and determine the percent RSD's of the unspiked sample, matrix spike, and matrix spike duplicate. No limits have been developed for the RSD values of the unspiked compounds.

FRACTION	COMPOUND	SAMPLE, MS, MSD CONC.	%RSD

The reviewer must use professional judgment to determine if there is a need to qualify any of the unspiked compounds in the sample.

VIII. FIELD DUPLICATE PRECISION

TR Nos. _____, _____ Matrix: _____

List the concentrations of the compounds which do not meet the following RPD criteria:

1. An RPD of <30% for water duplicates.
2. An RPD of <50% for soil duplicates.

FRACTION	COMPOUND	SAMPLE CONC	DUP SAMPLE CONC	RPD

ACTIONS:

1. If the results for any compounds do not meet the RPD criteria, flag the positive results for that compound as estimated.

2. If one value is non-detected, and one is above the CRQL:
   a. Flag the positive result as estimated (J).
   b. Flag the non-detected result as estimated (UJ).

NOTE: Professional judgment may be utilized to apply duplicate action to all samples of a similar matrix.

A separate worksheet should be filled out for each field duplicate pairs.

IX. INTERNAL STANDARD PERFORMANCE

List the internal standard areas of samples which do not meet the criteria of +100% or -50% of the internal standard area in the associated continuing calibration standard.

SAMPLE ID	DATE	IS OUT	IS AREA/ RT	ACCEPTABLE RANGE	ACTION

ACTION:

1. If an IS area count is outside the criteria -50% or +100% of the associated standard:

   a. Positive results for compounds quantitated using that IS are flagged as estimated (J) for that sample fraction.
   b. Non-detects for compounds quantitated using that IS are flagged as estimated (UJ) for that sample fraction.
   c. If extremely low area counts are reported, or if performance exhibits a major drop-off, then a severe loss of sensitivity is indicated. Non-detects should then be flagged as unusable (R).

2. If an IS retention time varies more than 30 seconds, the chromatographic profile for that sample must be examined to determine if any false positives or negatives exist. For shifts of a large magnitude, the reviewer may consider partial or total rejection of the data for that sample fraction.

REGION I
Data Review Worksheets

X A. PESTICIDE INSTRUMENT PERFORMANCE (Section 1)

1. DDT Retention Time

List the DDT standards which have a retention time (RT) of less than 12 minutes on the packed column (except OV-1 or OV-101).

SAMPLE ID	DATE	IS OUT	IS AREA/ RT	ACCEPTABLE RANGE	ACTION

Note: A megabore or capillary column standard RT may be shorter than 12 minutes.

ACTION:

If the RT is less than 12 minutes, examine the chromatography to evaluate the separation. If adequate separation is not achieved, flag all affected compound data as unusable (R).

X B. PESTICIDE INSTRUMENT PERFORMANCE (Section 2)
(Form is for both organophosphorous pesticides and herbicides as well as organochlorine pesticides

2. Retention Time Windows

List the compounds which are not within the established windows.

COMPOUND	DATE (TIME)	RT	RT WINDOW	SAMPLES AFFECTED

Check the sample chromatograms of the samples analyzed after the last in control standard for peaks within an expanded window. If no peaks are present, there is usually no effect on the data. Refer to Regional guidelines for information on qualifying data if peaks are present. If peaks are present, discuss actions below:

X C. PESTICIDE INSTRUMENT PERFORMANCE (Section 3)

3. DDT and Endrin Degradation

List the standards which have a DDT or Endrin breakdown of greater than 20%.

STANDARD ID	DDT OR ENDRIN	PERCENT BREAKDOWN	ENDRIN SAMPLES AFFECTED	DDD, DDE OR ENDRIN KETONE PRESENT

If the percent breakdown for DDT is greater than 20%.

1. Flag all positive results for DDT as estimated (J) for all samples following the last in control standard. If no DDT was present, but DDD and/or DDE are positive, then flag the quantification limit for DDT as unusable (R).

2. Flag all positive results for DDD +/or DDE as estimated (J).

If the percent breakdown for Endrin is greater than 20%:

1. Flag all positive results for endrin as estimated (J) for all samples following the last in-control standard. If no endrin was detected, but endrin aldehyde and/or endrin ketone are positive, flag the quantification limit for endrin as unusable (R).

2. Flag all positive results for endrin ketone as estimated (J).

X D. PESTICIDE INSTRUMENT PERFORMANCE (Section 4)

4. DBC Retention Time Check

List the percent difference for the DBC shift greater than 2% for packed columns, greater than 1.5% for wide-bore capillary columns, or greater than 0.3% for narrow-bore capillary columns.

TR #'s	DBC % DIFFERENCE	ACTIONS

If the DBC does not meet the retention time criteria, the analysis may be flagged as unusable (R) for the affected samples, but qualification of the data is left up to the professional judgment of the reviewer. Discuss any qualification of the data below:

XI A. PESTICIDE CALIBRATION (Sections 1 and 2)
(Form is for both organophosphorous pesticides and herbicides as well as organochlorine pesticides.)

1. Initial Calibration

List the compounds which did not meet the Relative Standard Deviation (RSD) criteria of less than 20% for the initial calibration on the quantification column.

DATE	COMPOUND	%RSD	COLUMN	SAMPLES AFFECTED

Flag all associated positive results as estimated (J) for samples which did not meet the %RSD criteria.

2. Analytical Sequence

Did the laboratory supply the analytical sequence utilized and the appropriate retention time windows for each analyte in the check standard as per the requirements of Method 8000 in SW-846 3rd Edition and the Radian QAPP. Yes or No.

If no,

The data may be affected. The data reviewer must use professional judgment to determine the severity of the effect and qualify the data accordingly. Discuss any actions below. Refer to Method 8000 protocols for guidance on any action taken. Contact the laboratory to discuss any anomalies encountered to prevent reoccurrence on future analysis.

XI B. PESTICIDE CALIBRATION (Section 3)

3. Continuing Calibration

List the compounds which did not meet the percent difference (%D) criteria of ±15% on the quantification column or ±20% on the confirmation for the continuing calibration.

DATE	COMPOUND	%D	COLUMN	SAMPLES AFFECTED

If the %D criteria is not met, flag all associated positive results as estimated (J).

XII. SAMPLE QUANTIFICATION

In the space below, please show a minimum of one sample calculation per fraction:

VOA:

BNA:

PEST/PCB:

Organosphorous pesticides

Herbicides

PCDD/PCDF

Organochlorine pesticides

XIII. ADDITIONAL APPENDIX IX Method specific validation checks involving Section A: Method 8150 (Herbicides); Section B: Method 8140 (Organophosphorous Pesticides); Section C: Method 8080 (Organochlorine Pesticide and PCBs),

A. Method 8150's surrogate standard is 2,4-dichlorophenyl acetic acid
List the surrogate percent recovery:
List the QC limits listed on the Summary Form for each obtained from the Herbicides Table (8150)
Surrogate Actions:

	Percent Recovery		
	<10%	10%-R(MIN)>R(MAX)	
Positive Sample Results	J	J	J
Non-detected Results	R	UJ	advisory only

Note: The laboratory must report an acceptable surrogate recovery range as per the requirements of Sections 8.3 of Method 8150. As such, the Method 8150 surrogate spike acceptance window is 50-150% for both waters and solids. The R(MIN) is 50% and R(MAX) is 150%. Method 8150's MS/MSD's are 2,4-D, Dinoseb, 2,4,5-T and 2,4,5-TP (Silvex).

List the Method 8150 (Herbicides) percent recoveries and RPDs of compounds which do not meet the criteria listed on EPA Form III by Radian (laboratory).

Fraction/ MS or MSD	% Rec Compound	% Rec/RPD	QC Limits

TABLE 8150: HERBICIDES

Parameter	Matrix Spike (a) Precision RPD% (b) Water	Matrix Spike (a) Precision RPD% (b) Solids	Matrix Spike (a) Accuracy % of Recovery Water	Matrix Spike (a) Accuracy % of Recovery Solids	Surrogate Spike Accuracy (c) % of Recovery Water	Surrogate Spike Accuracy (c) % of Recovery Solids
SW-846 (3rd Ed.) Method 8150						
Herbicides:						
2,4-D	13	N/A	69-159	N/A	--	--
Dinoseb	15	N/A	56-150	N/A	--	--
2,4,5-TP	25	N/A	29-182	N/A	--	--
2,4,5-T	9	N/A	82-138	N/A	--	--
2,4-Dichlorophenylaceticacid	--	--	--	--	50-150	50-150

(a) Matrix spike precision and accuracy goals, where stated, are found in EPA method references and will be used as starting points. Limits developed in-house will be used and updated throughout the program.

(b) "RPD" = relative percent difference. Precision is expressed according to the type of measurement (i.e., for field duplicates precision is expressed as the RPD between duplicate results).

(c) Accuracy goals stated are from EPA CLP, SW-846 methods, or Radian derived limits. These limits willbe used as starting points for control chart generation. Limits developed in-house will be used and updated throughout the program.

N/A Not available (to be developed by Radian).

B. The surrogate standard for Method 8140 is triphenyl phosphate. For waters the acceptance window is 40-140% [R(MIN):40; R(MAX):140] and for solids the acceptance window is 42-154% [R(MIN):42; R(MAX):154]. Method 8140's MS/MSD compounds are: dimethoate, thionazin, sulfotepp, disulfotan, ethylparathion, famphur, methylparathion and phorate. Refer to Table 8140.

List the percent recovery:
List the QC limits listed on the Summary Form for each obtained from the Organophosphorous Pesticides Table (8140)
Surrogate Actions:

	Percent Recovery		
	<10%	10%-R(MIN)>R(MAX)	
Positive Sample Results	J	J	J
Non-detected Results	R	UJ	advisory only

List the Method 8140 (Organophosphorous Pesticide) percent recoveries and RPD's of compounds which do not meet the criteria listed on EPA Form III by Radian (laboratory).

Fraction/ MS or MSD	% Rec Compound	% Rec/RPD	QC Limits

TABLE 8140: ORGANOPHOSPHOROUS PESTICIDES

Parameter	Standard Deviation Water	Standard Deviation Solids	Accuracy (a) % of Recovery Water	Accuracy (a) % of Recovery Solids	Accuracy (a) % of Recovery Water	Accuracy (a) % of Recovery Solids
SW-846 Method 8140						
Organophosphorus Pesticides:						
Dimethoate	N/A	N/A	N/A	N/A	--	--
Famphur	50	33	10-168	10-136	--	--
Ethylparathion	14	21	45-112	29-133	--	--
Thionazin	N/A	N/A	N/A	N/A	--	--
Disulfoton	36	39	10-138	10-219	--	--
Methyl Parathion	35	36	10-213	10-177	--	--
Phorate	32	33	10-183	10-166	--	--
Sulfotepp	N/A	N/A	32-124	10-165	--	--
Triphenylphosphate	--	--	--	--	23-176	28-174

(a) These limits were developed in-house. Radian will update these throughout the progam.

N/A Not available (to be developed by Radian).

C. Method 8080 (Organochlorine Pesticide and PCBs)
The surrogate standard is dibutylchlorendate. For waters the acceptance windor is 24-154% [R(MIN):24; R(MAX):154] and for solids the acceptance window is 20-150% [R(MIN):20; R(MAX):150].

List the percent recovery:

List the QC limits listed on the Summary Form for each obtained from the Organochlorine Pesticide and PCB Table 8080.

Surrogate Actions:

	Percent Recovery		
	<10%	10%-R(MIN)>R(MAX)	
Positive Sample Results	J	J	J
Non-detected Results	R	UJ	advisory only

Note: The laboratory must report an acceptable surrogate recovery range as per the requirements of Section 8.3 of Method 8080. As such, the Method 8080 surrogate spike acceptance window is 24 - 154% for waters and 20 - 150% for solid notices. The MS/MSD compounds are: gamma - BHC, heptochlor, aldrin, dieldrin, endrin and 4,4[1]-DDT. Refer to Table 8080.

List the Method 8080 (Organochlorine Pesticide and PCBs) percent recoveries and RPDs of compounds which do not meet the criteria listed on EPA Form III by Radian (laboratory).

If any compound does not meet the RPD criteria, flag positive results for that compound as estimated (J).

Fraction/ MS or MSD	% Rec Compound	% Rec/RPD	QC Limits

TABLE 8080: ORGANOCHLORINE PESTICIDES AND PCBs

	Matrix Spike (a)				Surrogate Spike	
	Precision RPD% (b)		Accuracy % of Recovery		Accuracy (c) % of Recovery	
Parameter	Water	Solids	Water	Solids	Water	Solids
Pesticides/Polychlorinated Biphenyls:						
gamma-BHC	15	50	56-123	46-127	--	--
Heptachlor	20	31	40-131	35-130	--	--
Aldrin	22	43	40-120	34-132	--	--
Dieldrin	18	38	52-126	31-134	--	--
Endrin	21	45	56-121	42-139	--	--
4,4'-DDT	27	50	38-127	23-134	--	--
Dibutylchlorendate	--	--	--	--	24-154	20-150

(a) Matrix spike precision and accuracy goals, where stated, are found in EPA method references and will be used as starting points. Limits developed in-house will be used and updated throughout the program.

(b) "RPD" = relative percent difference. Precision is expressed according to the type of measurement (i.e., for field duplicates precision is expressed as the RPD between duplicate results).

(c) Accuracy goals stated are from EPA CLP, SW-846 methods, or Radian derived limits. These limits will be used as starting points for control chart generation. Limits developed in-house will be used and updated throughout the program.

XIV.Dioxin (Method 8280: Full Scan Tetra-Octa including 2,3,7,8-TCDD)

Refer to Appendix B for Radian Dioxin Summary Forms. QAPP QA/QC criteria for dioxins are listed below:

PCDD AND PCDF (DIOXINS AND FURANS)
QUALITY CONTROL OBJECTIVES

Parmeter	Precision RPD % for Duplicate Analyses (a) Water
PCDD	60-140
PCDF	60-140

(a) These objectives are for recovery check samples, it is anticipated that the field samples will fall within these objectives.

ORGANIC REGIONAL DATA ASSESSMENT

REFERENCE NO.:
LABORATORY:
SDG #:
SW846, 3RD EDITION:

SITE: CIBA-GEIGY, CRANSTON, RI
NO. OF SAMPLES/ MATRIX:
REVIEWER (IF NOT ESD):
REVIEWER'S NAME:
COMPLETION DATE:

DATA ASSESSMENT SUMMARY

	VOA	BNA	PEST	Organo-P,CL PESTICIDES	HERBICIDES	PCDD PCDF
1. HOLDING TIMES						
2. GC/MS TUNE/INSTR. PERF.						
3. CALIBRATIONS						
4. BLANKS						
5. SURROGATES						
6. MATRIX SPIKE/DUP						
7. OTHER QC						
8. INTERNAL STANDARDS						
9. COMPOUND IDENTIFICATION						
10. SYSTEM PERFORMANCE						
11. OVERALL ASSESSMENT						

O = Data had no problems/or qualified due to minor problems.
M = Data qualified due to major problems.
Z = Data unacceptable.
X = Problems, but do not affect data.

ACTIONS ITEMS:

AREAS OF CONCERN:

APPENDIX A
MATRIX SPIKE RPD MAXIMUMS AND PERCENT RECOVERIES

MS/MSD QA/QC CRITERIA
VOLATILES

	Matrix spike(a)			
	Precision RPD %(b)		Accuracy (a) % of Recovery	
Parameter	Water	Solids	Water	Solids
Volatiles				
Trichloroethene	14	24	71-120	62-137
Benzene	11	21	76-127	66-142
Toluene	13	21	76-125	59-139
Chlorobenzene	13	21	75-130	60-133
1,1-Dichloroethene	14	22	61-145	59-172
Toluene-d8	--	--	--	--
4-Bromofluorobenzene	--	--	--	--
1,2-Dichloroethane-d4	--	--	--	--

(a) Matrix spike precision and accuracy goals, where stated, are found in EPA method references and will be used as starting points. Limits developed in-house will be used and updated throughout the program.

(b) "RPD" = relative percent difference. Precision is expressed according to the type of measurement (i.e., for field duplicates precision is expressed as the RPD between duplicate results).

(c) Surrogate recoveries are listed on page 9 of 28.

MS/MSD QA/QC CRITERIA
SEMIVOLATILES

	Matrix spike(a)			
	Precision RPD %(b)		Accuracy (a) % of Recovery	
Parameter	Water	Solids	Water	Solids
GC/MS Semivolatiles:				
Phenol	42	35	12-89	26-90
2-Chlorophenol	40	50	27-123	25-102
1,4-Dichlorobenzene	28	27	36-97	28-104
N-Nitroso-di-n-propyl-amine	38	38	41-116	41-126
1,2,4-Trichlorobenzene	28	23	39-98	38-107
Acenaphthylene	31	39	46-118	31-137
4-Nitrophenol	50	50	10-80	11-114
2,4-Dinitrotoluene	38	47	24-96	28-89
Pentachlorophenol	50	47	9-103	17-109
Pyrene	31	36	26-127	35-142
Nitrobenzene-d5	--	--	--	--
2-Fluorobiphenyl	--	--	--	--
p-Terphenyl-d14	--	--	--	--
2-Fluorophenol	--	--	--	--
2,4,6-Tribromophenol	--	--	--	--
Propazine	18*	5*	34-118*	77-100*
Tinuvin-327	15*	6*	47-123*	77-107*

(a) Matrix spike precision and accuracy goals, where stated, are found in EPA method references and will be used as starting points. Limits developed in-house will be used and updated throughout the program.

(b) "RPD" = relative percent difference. Precision is expressed according to the type of measurement (i.e., for field duplicates precision is expressed as the RPD between duplicate results).

(c) Surrogate recoveries are listed on page 9 of 28.

* These values were calculated based on data collected from the reageant spike blanks and fine sediment samples. These data will be updated as more data points become available throughout Round I.

MS/MSD QA/QC CRITERIA
PESTICIDE/PCBs

	Matrix spike(a)			
	Precision RPD %(b)		Accuracy (a) % of Recovery	
Parameter	Water	Solids	Water	Solids
Pesticides/Polychlorinated Biphenyls:				
gamma-BHC	15	50	56-123	46-127
Heptachlor	20	31	40-131	35-130
Aldrin	22	43	40-120	34-132
Dieldrin	18	38	52-126	31-134
Endrin	21	45	56-121	42-139
4,4'-DDT	27	50	38-127	23-134
Dibutylchlorendate	--	--	--	--

(a) Matrix spike precision and accuracy goals, where stated, are found in EPA method references and will be used as starting points. Limits developed in-house will be used and updated throughout the program.

(b) "RPD" = relative percent difference. Precision is expressed according to the type of measurement (i.e., for field duplicates precision is expressed as the RPD between duplicate results).

(c) Surrogate recoveries are listed on page 9 of 28.

APPENDIX B

DIOXIN SUMMARY FORMS

METHOD 8280 (FULL-SCAN)

TETRA - OCTA

WORKSHEET TO CALCULATE TOXICITY EQUIVALENT FACTORS (TEFs)

INSTRUCTIONS: TEFs BASED ON THE DRAFT 4/89 CLP DIOXIN PROTOCOL

Results for Each Sample Are Given Two Lines: The top line is the concentration of the analyte in ppb.
The bottom line equates that concentration to the toxic equivalent of 2,3,7,8-TCDD.

Sample ID#	Total TEF	Other TCDD [0.01]	2,3,7,8 TCDD [1.0]	Other PCDD [0.005]	2,3,7,8 PCDD [0.5]	Other HxCDD [0.0004]	2,3,7,8x HxCDD [0.04]	Other HpCDD [0.0004]	2,3,7,8x HpCDD [0.001]	OCDD [0]	Other TCDF [0.001]	2,3,7,8 TCDF [0.1]	Other PCDF [0.0004]	2,3,7,8x PCDF 0.05,1 [0.1]	Other HxCDF [0.0001]	2,3,7,8x HxCDF [0.001]	Other HpCDF [0.00001]	2,3,7,8x HpCDF [0.001]	OCDF [0]

87X4660\WORKSHT.2

SW-846 METHOD 8280

DIOXIN

SUMMARY

FORMS
CIBA-GEIGY SITE
CRANSTON, RHODE ISLAND

Form 2: Internal Standard Recovery
Form 3: Initial Calibration Summary
Form 4: Continuing Calibration Summary
Form 5: Standard Worksheet
Form 6: Sample Worksheet
Form 7: Quality Control Report
Form B-6: Dioxin Raw Sample Data (TCDD, TCDF)
Form B-6A: Dioxin Raw Sample Data (PCDD, PCDF)
Form B-6B: Dioxin Raw Sample Data (HxCDD, HxCDF)
Form B-6C: Dioxin Raw Sample Data (HpCDD,HpCDF)
Form B-6D: Dioxin Raw Sample Data (OCDD, OCDF)

DIOXIN AND FURAN DATA VALIDATION WORKSHEET

Based on Method 8280 in SW-846 (3rd Edition) and Radian's Standard Operating Procedure
11/09/90
Prepared by Diana Baldi, CIBA-GEIGY
Reviewed by John Lorenzo, Woodward-Clyde Consultants

REQUIREMENTS	ACCEPTABLE LIMITS	ACTION IF EXCEEDED
Initial calibration 5 point curve in triplicate (Form 3)	% RSD between 3 runs must be <15% for all analytes	Recalculate concentration using daily RF; note in narrative; request reanalysis for compliance
PCDD/PCDF retention time standard	First and last eluting isomer must be detected	Request reanalysis
Chromatography standard (included in RT standard)	>25% valley between 1,2,3,4-TCDD and 2,3,7,8-TCDD	Look for high bias in any positives for 2,3,7,8-TCDD; if sample results affected, request reanalysis
Continuing calibration (Form 4)	a) RF <30% of eve RF from initial calibration b) All major chlorine isotope cluster abundances within 15% of theoretical	a) Recalculate concentration using daily RF; note in narrative b) Look for false negatives due to failing ion criteria; Note: Calculate EMPC, include EMPC in TE; if action level request reanalysis
Identification of positives	a) Major chlorine isotope cluster ions must be within 15% of theoretical b) COCL loss peak must be present c) Peak maxima must agree within 2 scans	a) See b) above b) Look for false positives c) Look for false positives
Internal standards (Form 2)	a) Must be present at least 10:1 signal to noise ratio in all standards and samples b) Should have absolute recovery greater than 40%	a) Require reanalysis b) No action if S:N criteria met
Surrogate accuracy	Within 40% to 120%	Options: a) No action b) Add "J" qualifier to associated homologs

The process of data validation flows as follows:

Step 1: Performance evaluation (PE) samples will be incorporated in the field shipment of samples to Radian. The results of the PE samples will be validated according to the protocols stated above. The validated results will be called in to USEPA Region I designee. Upon reporting the results, the true values will be released to CIBA-GEIGY designee (Diana Baldi). If the results are outside the USEPA acceptance limits, a reanalysis of the entire sample set will be required. If the results of the PE are acceptable, then validation of the remaining samples will proceed.

Note: The worksheets provided as an appendix will be used when appropriate.

Step 2: Verify all internal standards in all samples have S:N 10:1 utilizing Form 2.

Step 3: Calculate all ion ratios (Form 5) for peaks that may be positives in samples; spot check ion ratios in the continuing and initial calibration focusing on those congeners that may have false negatives in samples due to ion ratios.

Step 4: Spot check the criteria in the initial and continuing calibration data submitted in Forms 3 and 4. Note if RT for the internal standards shift during the time of analysis for the sample group.

Step 5: Look for RT cutoff points for each homolog based on RT standard. Look for potential false negatives due to being outside the established RT window because of a RT shift.

Step 6: Recalculate all positives and EMPC using either the initial eve RF or the continuing calibration RF (as stated in the above criteria table).

Step 7: Enter the data into the TEF spreadsheet. Look for anything unusual and recheck all entries.

The final results are to be presented in a table that includes the concentration of each of the twelve reported values (2,3,7,8-TCDD, 2,3,7,8-TCDF, tetra thru octa chlorinated dibenzo-p-dioxins and dibenzofurans). The table will also calculate the total Toxicity Equivalents (TE). The TE values are based on the 9 November 1988 Revised Dioxin TE Factors memo.

FORM 2

INTERNAL STANDARD RECOVERY

LAB ID	EPA ID	*C-TCDD	*C-HxCDD	*C-OCDD	*C-TCDF	*C-HpCDF

*C-TCDD :Carbon 13 labeled 2,3,7,8-tetrachlorodibenzodioxin

*C-HxCDD:Carbon 13 labeled 1,2,3,6,7,8-hexachlorodibenzodioxin

*C-OCDD :Carbon 13 labeled octachlorodibenzodioxin

*C-TCDF :Carbon 13 labeled 2,3,7,8-tetrachlorodibenzofuran

*C-HpCDF:Carbon 13 labeled 1,2,3,4,6,7,8-heptachlorodibenzofuran

FORM 3
INITIAL CALIBRATION SUMMARY

						$\overline{RF}$	SD	RSD
INSTRUMENT								
CONC.								
TIME								
STD.ID.								
COMPOUND								
2378 TCDD								
12378 PeCDD								
123478 HxCDD								
123678 HxCDD								
123789 HxCDD								
1234678 HpCDD								
OCDD								
2378 TCDF								
12378 PeCDF								
23478 PeCDF								
123478 HxCDF								
123678 HxCDF								
123789 HxCDF								
234678 HxCDF								
1234678 HpCDF								
1234789 HpCDF								
OCDF								
*C-TCDD[1]								
*C-TCDF[1]								
*C-HxCDD[2]								
*C-HpCDF[2]								
*C-OCDD[2]								

IS	STANDARDS	conc. pg/ul
*C-TCDD	*13C12-2,3,7,8-TCDD	
*C-TCDF	*13C12-2,3,7,8-TCDF	
*C-HxCDD	*13C12-1,2,3,6,7,8-HxCDD	
*C-HpCDF	*13C12-1,2,3,4,6,7,8-HpCDD	
*C-OCDD	*13C12-OCDDP	

1. Based on recovery standard 13C-1234-TCDD
2. Based on recovery standard 12C-123789-HxCDD

FORM 4
CONTINUING CALIBRATION SUMMARY

INSTRUMENT

	INITIAL CURVE (RF)	CONT. CALIB. (RF)	RPD	CONT. CALIB. (RF)	RPD	CONT. CALIB. (RF)	RPD
CONC.							
DATE/TIME							
STD.ID.							
2378 TCDD							
12378 PeCDD							
123478 HxCDD							
123678 HxCDD							
123789 HxCDD							
1234678 HpCDD							
OCDD							
2378 TCDF							
12378 PeCDF							
23478 PeCDF							
123478 HxCDF							
123678 HxCDF							
123789 HxCDF							
234678 HxCDF							
1234678 HpCDF							
1234789 HpCDF							
OCDF							
*C-TCDD[1]							
*C-TCDF[1]							
*C-HxCDD[2]							
*C-HpCDF[2]							
*C-OCDD[2]							

FORM 5
STANDARD WORKSHEET

DATE :_____
INJ TIME:_____
STD ID :_____
COLUMN :_____
INST ID :_____

	SCAN#'s	ION	AREA	ION	AREA*	AREA/AREA*	CONC	RRF
13C-1234-TCDD	_____	(332)	_____	(334)	_____			
13C-2378-TCDD**	_____	(332)	_____	(334)	_____			
2378-TCDD[1]	_____	(320)	_____	(322)	_____			
12378-PeCDD[1]	_____	(358)	_____	(356)	_____			
13C-123789-HxCDD	_____	(404)	_____	(402)	_____			
13C-123678-HxCDD***	_____	(404)	_____	(402)	_____			
__2378-HxCDD[2]	_____	(392)	_____	(390)	_____			
1234678-HpCDD[2]	_____	(426)	_____	(424)	_____			
13C-OCDD***	_____	(470)	_____	(472)	_____			
OCDD[3]	_____	(458)	_____	(460)	_____			
13C-2378-TCDF**	_____	(316)	_____	(318)	_____			
2378-TCDF[4]	_____	(304)	_____	(306)	_____			
_2378-PeCDF[4]	_____	(342)	_____	(340)	_____			
__2378-HxCDF[5]	_____	(376)	_____	(374)	_____			
13C-1234678-HpCDF***	_____	(422)	_____	(420)	_____			
___2378-HpCDF[5]	_____	(410)	_____	(408)	_____			
OCDF[5]	_____	(442)	_____	(444)	_____			

* - Ion used for quanitation
** - Quanitation based on 13C-1,2,3,4-TCDD
*** - Quanitation based on 13C-1,2,3,7,8,9-HxCDD
1 - Int Std 13C-2,3,7,8-TCDD
2 - Int Std 13C-1,2,3,6,7,8-HxCDD
3 - Int Std 13C-OCDD
4 - Int Std 13C-2,3,7,8-TCDF
5 - Int Std 13C-1,2,3,4,6,7,8-HpCDF

NOTE: If more than one ratio is required please write ratios directly on EICP.

FORM 6
SAMPLE WORKSHEET

COLUMN :_____
INST ID :_____
CURVE/STDS:_____
COMMENTS :_____

DATE :_____
INJ TIME :_____
CLIENT ID :_____
SAMPLE ID :_____
SAMPLE SIZE:_____

	SCAN#'s	ION	AREA	ION	AREA*	AREA/AREA*	CONC	RRF	DL
13C-1234-TCDD		(332)		(334)					
13C-2378-TCDD**		(332)		(334)					
2378-TCDD[1]		(320)		(322)					
TOTAL-TCDD[1]		(320)		(322)					
12378-PeCDD[1]		(358)		(356)					
TOTAL-PeCCD[1]		(358)		(356)					
13C-123789-HxCDD		(404)		(402)					
13C-123678-HxCDD***		(404)		(402)					
XX2378-HxCDD[2]		(392)		(390)					
TOTAL-HxCDD[2]		(392)		(390)					
1234678-HpCDD[2]		(426)		(424)					
TOTAL-HpCDD[2]		(426)		(424)					
13C-OCDD***		(470)		(472)					
OCDD[3]		(458)		(460)					
13C-2378-TCDF**		(316)		(318)					
2378-TCDF[4]		(304)		(306)					
TOTAL-TCDF[4]		(304)		(306)					
X2378-PeCDF[4]		(342)		(340)					
TOTAL-PeCDF[4]		(342)		(340)					
XX2378-HxCDF[5]		(376)		(374)					
TOTAL-HxCDF[5]		(376)		(374)					
13C-1234678-HpCDF***		(422)		(420)					
XXX2378-HpCDF[5]		(410)		(408)					
TOTAL-HpCDF[5]		(410)		(408)					
OCDF[5]		(442)		(444)					

* - Ion used for quanitation
** - Quanitation based on 13C-1,2,3,4-TCDD
*** - Quanitation based on 13C-1,2,3,7,8,9-HxCDD
1 - Int Std 13C-2,3,7,8-TCDD
2 - Int Std 13C-1,2,3,6,7,8-HxCDD
3 - Int Std 13C-OCDD
4 - Int Std 13C-2,3,7,8-TCDF
5 - Int Std 13C-1,2,3,4,6,7,8-HpCDF

_____
TEF _____
_____

NOTE: If more than one ratio is required please write ratios directly on EIC

FORM 7
QUALITY CONTROL REPORT

CASE NO. _____
SITE _____
EPA SAMPLE ID. _____

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

COMPOUND (units)	SAMPLE CONC. ( )	SPIKE ADDED MS ( )	MS CONC. ( )	MS %REC	SPIKE ADDED MSD ( )	MSD CONC. ( )	MSD %REC.	%RPD
TCDD								
PeCDD								
HxCDD								
HpCDD								
OCDD								
TCDF								
PeCDD								
HxCDD								
HpCDD								
OCDD								

Form B-6

DIOXIN RAW SAMPLE DATA

Laboratory: _____ Sample No.: _____

Case/Batch No.: _____ Analyst(s): _____

TCDD Required 320/322 Ratio Window is 0.65-0.89

No. Peaks	Scan No.	320/322	Confirm as TCDD Y/N	Quantitated vs C-13 2378-TCDD	Quantitated vs C-13 1234-TCDD	Dilution	Conc.
					Total TCDD:		

TCDF Required 304/306 Ratio Window is 0.65-0.89

No. Peaks	Scan No.	304/306	Confirmed as TCDF Y/N	Quantitated vs C-13 2378-TCDD	Quantitated vs C-13 1234-TCDD	Dilution	Conc.
					Total TCDF:		

Form B-6A

DIOXIN RAW SAMPLE DATA

Laboratory: _____ Sample No.: _____

Case/Batch No.: _____ Analyst(s): _____

PCDD Required 358/356 Ratio Window is 0.55-0.75

No. Peaks	Scan No.	358/356	Confirm as PCDD Y/N	Quantitated vs C-13 2378-TCDD	Quantitated vs C-13 1234-TCDD	Dilution	Conc.
					Total PeCDD:		

PCDF Required 342/340 Ratio Window is 0.55-0.75

No. Peaks	Scan No.	342/340	Con-firmed as PCDD Y/N	Quantitated vs C-13 2378-TCDD	Quantitated vs C-13 1234-TCDD	Dilution	Conc.
					Total PeCDF:		

Form B-6B

DIOXIN RAW SAMPLE DATA

Laboratory:_____ Sample No.:_____

Case/Batch No.:_____ Analyst(s):_____

HxCDD Required 392/390 Ratio Window is 0.69-0.93

No. Peaks	Scan No.	392/390	Confirm as PCDD Y/N	Quantitated vs C-13 2378-TCDD	Quantitated vs C-13 1234-TCDD	Dilution	Conc.
					Total HxCDD:		

HxCDF Required 376/374 Ratio Window is 0.60-0.93

No. Peaks	Scan No.	376/374	Con-firmed as PCDF Y/N	Quantitated vs C-13 2378-TCDD	Quantitated vs C-13 1234-TCDD	Dilution	Conc.
					Total HxCDF:		

Form B-6C

DIOXIN RAW SAMPLE DATA

Laboratory: _____ Sample No.: _____

Case/Batch No.: _____ Analyst(s): _____

HpCDD Required 426/424 Ratio Window is 0.83-1.12

No. Peaks	Scan No.	426/424	Confirm as HpCDD Y/N	Quantitated vs C-13 OCDD	Quantitated vs C-13 1234-TCDD	Dilution	Conc.
					Total HpCDD:		

HpCDF Required 410/408 Ratio Window is 0.83-1.12

No. Peaks	Scan No.	410/408	Confirmed as HpCDF Y/N	Quantitated vs C-13 OCDD	Quantitated vs C-13 1234-TCDD	Dilution	Conc.
					Total HpCDF:		

Form B-6D

DIOXIN RAW SAMPLE DATA

Laboratory: _____ Sample No.: _____

Case/Batch No.: _____ Analyst(s): _____

OCDD Required 458/460 Ratio Window is 0.75-1.01

No. Peaks	Scan No.	458/460	Confirm as OCDD Y/N	Quantitated vs C-13 OCDD	Quantitated vs C-13 1234-TCDD	Dilution	Conc.
					Total OCDD:		

OCDF Required 442/444 Ratio Window is 0.75-1.01

No. Peaks	Scan No.	442/444	Confirmed as OCDD Y/N	Quantitated vs C-13 OCDD	Quantitated vs C-13 1234-TCDD	Dilution	Conc.
					Total OCDF:		